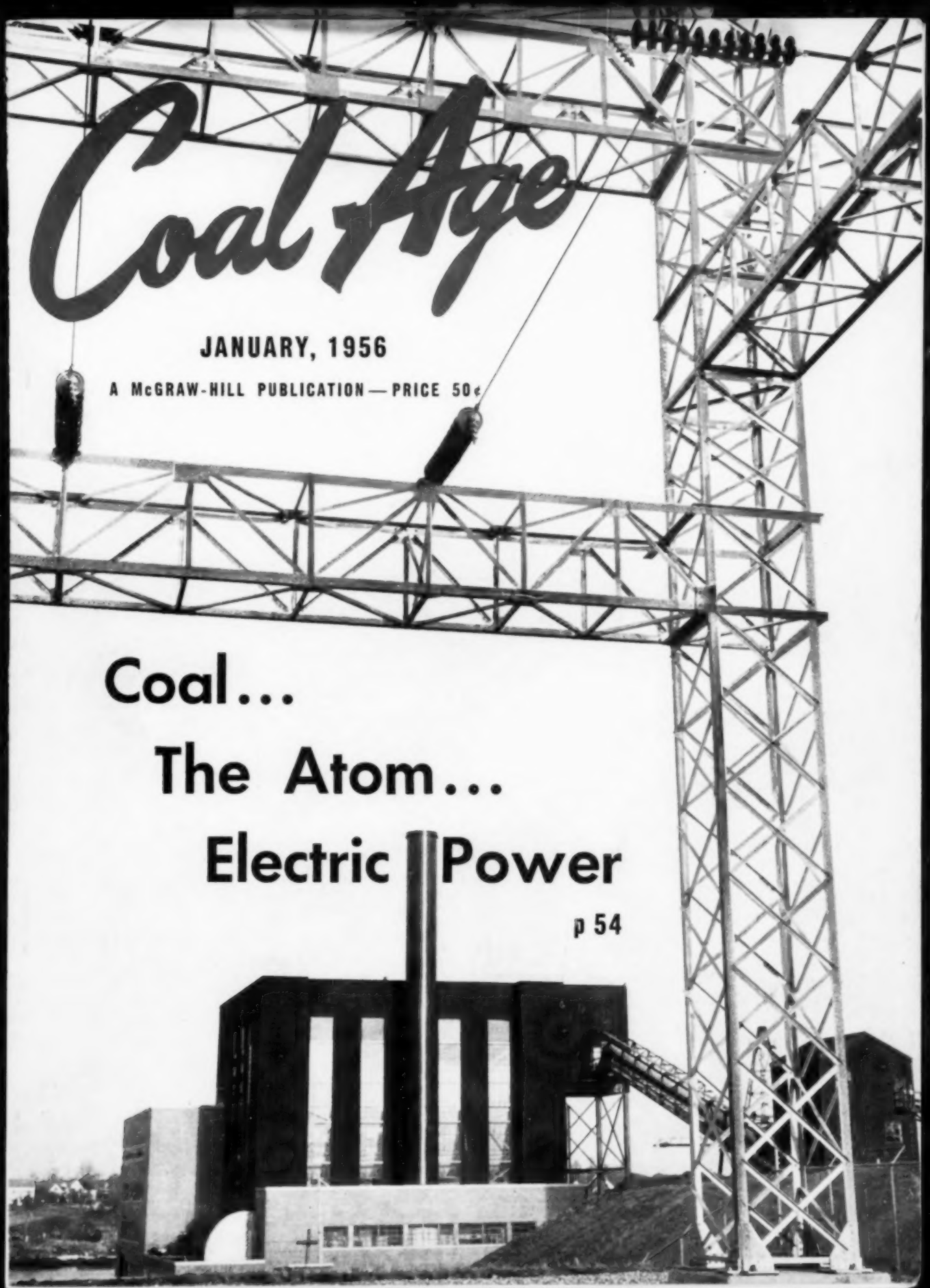
Coal Age

JANUARY, 1956

A McGRAW-HILL PUBLICATION — PRICE 50¢



Coal... The Atom... Electric Power

p 54

edison self-service

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The miner serves himself! In seconds he has his lamp off the rack, on his belt, and is ready for his shift. And the same holds true when the shift is over. Add it up . . . Edison Self-Service pays off in maximum lamproom economy.

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See that double filament in the bulb? It's your proved protection against lost time for the miner, and a short crew for the foreman. If one filament burns out, a turn of the switch restores continued, brilliant, full illumination—*working light*, not just emergency light!

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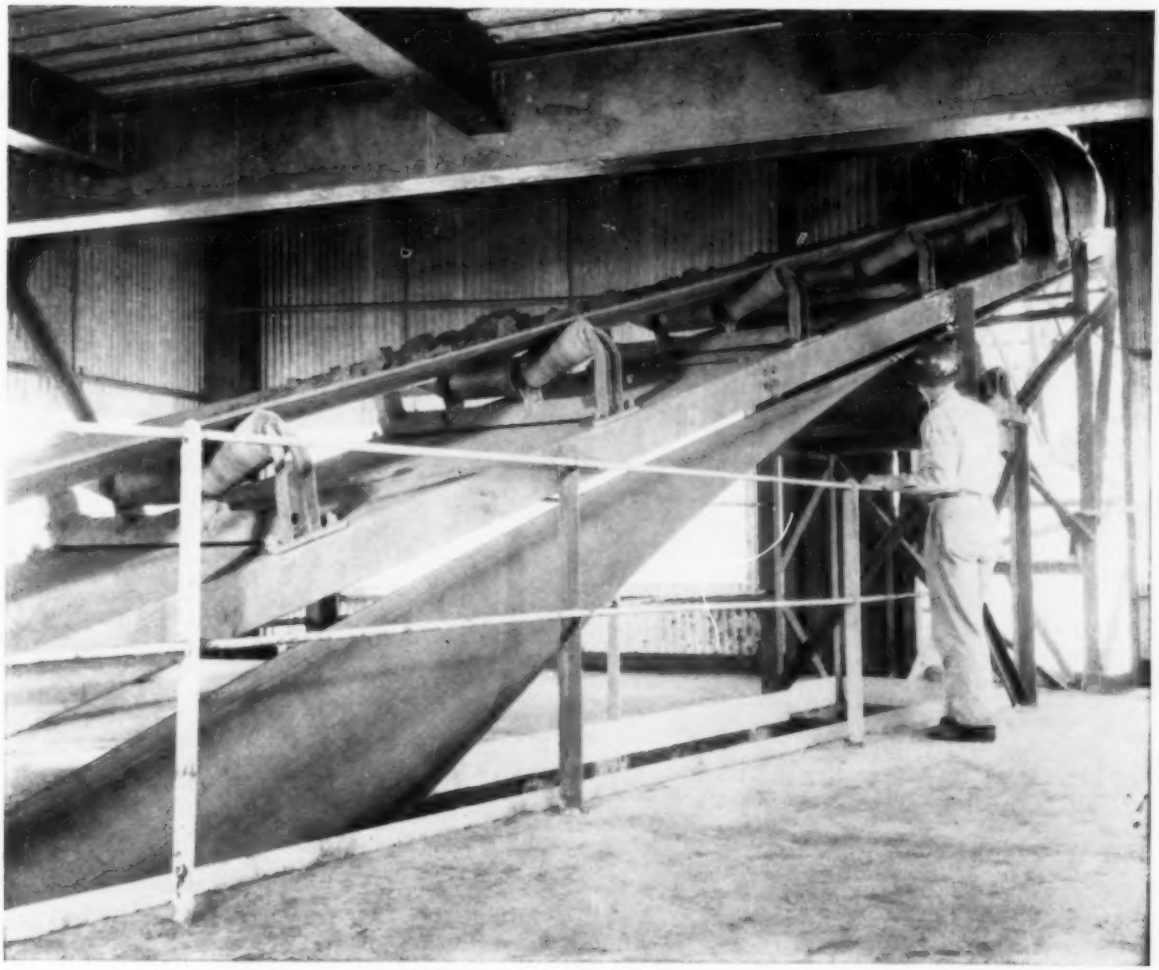
RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



How conveyors stay clean even when load is sticky

THAT stuff riding the conveyor belt is refuse from a coal washing plant on its way to a dumping point—550 feet uphill. When plans were drawn up, engineers said the usual conveyor system wouldn't be the answer here. They knew the wet clay and sticky sand would cling to the belt, build up into gummy layers, clog the return idlers and pulleys, and damage the belt cover.

To avoid this trouble, they installed something quite different in conveyors —the B. F. Goodrich "Turnover" belt system. Here's how it works. As the material is dumped off the end of the moving belt, the belt makes a 180° turn, runs empty along the return idlers, then makes another one-half turn (as shown above) before receiving the next load.

Only the clean side of the belt touches the idlers, so there's no chance for sticky materials to build up on them. Even wet materials can be handled in cold weather without danger of the belt freezing to the rotating metal parts.

With the "Turnover" belt, expensive decking can be eliminated. Clean up of spillage is no problem because any material that falls on the lower run of the belt is carried to the end and dumped off when the belt makes its turn. Damage to belt body is reduced because lumps of materials cannot be trapped between the belt and pulleys.

If you have an operation where sticky, freezing or corrosive materials must be moved from place to place, the B. F. Goodrich "Turnover" conveyor system can save you trouble and money. Your B. F. Goodrich distributor can give you full details and show you how easy it is to convert any conventional system into the turnover type. *The B. F. Goodrich Company, Dept. M-531, Akron 18, Ohio.*

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

If AESOP had written

Remember the fable? When all the other animals were bragging about the number of their offspring, the Lioness proudly said, "I have only ONE cub—but he's a LION". In other words, QUALITY, not quantity or diversity, counts most—among animals, among men and, to get to our point, among LUBRICANTS.

HULBURT OIL & GREASE COMPANY

PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

this advertisement . . .

HE COULDN'T HAVE PUT IT ANY BETTER

Hulburt

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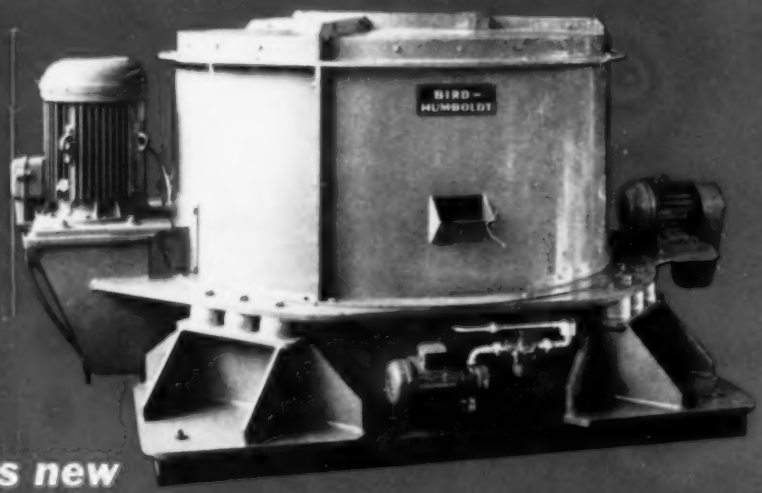
The point is—HULBURT makes lubricants for just ONE field of service—in the coal mine, on coal mining machinery. We don't "diversify" or try to cover all industry. We stick to our own field, the field we're supreme in—the coal field. That's why HULBURT gets the "lion's share" of business among experienced operators who know that specialization pays, that HULBURT Quality Lubricants meet coal mine conditions best, and that HULBURT PRODUCTS LUBRICATE LONGER. And that's no fable!

SHRINK THE COST AND THE WORK OF DEWATERING FINE COAL



with this new

BIRD-HUMBOLDT CENTRIFUGAL DRYER

It takes *less than* ½ *HP* to dewater a ton of fine coal with the new Bird-Humboldt Centrifugal Dryer.

Screens last for weeks instead of days and are exceedingly easy to install.

Solids recovery is high (98% or more) during the entire life of the screen.

Capacity is high — 70 to 80 tons per hour. Cost per ton is low.

Moisture content of the dewatered coal is low, even when feeds contain as little as 50% solids.

There is practically no degradation.

The Bird-Humboldt is exceedingly easy and economical to maintain. There is, in fact, nothing to maintain except the screen and screen life is exceedingly long.

Get the story on this great, new screen type coal dryer and how it works. Write for this new Bulletin.

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REGIONAL OFFICES: EVANSTON, ILLINOIS • PORTLAND, OREGON

Coal Age

JANUARY • 1956

Editorials: In Every Way; Others Too 53

Can The Atom Compete . . . In Making Tomorrow's Power— W. A. RALEIGH JR. 54

The Coal Commentator 61

Wet Rockdusting in Continuous Mining Cycle 62

How To Put Safety Into Maintenance— CHESTER WEBB ... 66

How To Ship a Dragline On The Railroad 68

Using 25-Ton Cars Underground 70

Managing Forests For Profit 74

Predicting Rock Falls— LLOYD E. ANTONIDES 78

Foremen's Forum: Point of Arrival, Point of Departure; How to See An Opportunity; Success Story 82

Operating Ideas: Mine-Tested Ideas Pay Off 86

Equipment News & Bulletins . . 90 *News Roundup*. 108

Coal Mining Institute Meeting 116

Coal Roundup

How did coal—anthracite and bituminous—do in 1955?

What's ahead for both industries in 1956 and subsequent years?

The answers to these and other questions will be the subjects of a group of at least six articles, plus editorials and other supporting material, in the February issue of *Coal Age*. Business, technical and safety developments will be reviewed and analyzed both by the editors and by outside authorities.

Business in '55 and '56—Topics scheduled for review and discussion include:

1. General business in the United States in 1956, by the McGraw-Hill Dept. of Economics.
2. The 1955 production record and what's ahead for 1956.
3. The competitive picture.
4. Merchandising, utilization and research developments.

Mining and Preparation—On the agenda for February:

1. Deep-mining progress and how the future looks.
2. Sales of mechanical loading and cleaning equipment in 1955.
3. Strip-mining developments.
4. Progress in preparation, including a summary of contracts for new plants.

Safety—The record for 1955, the technical developments of the year and the problems of the future.

On Our Cover

The Schiller station of the Public Service Co. of New Hampshire—a coal burner—appears on this month's front cover because it is considered one of the most efficient of its size in the world. Thus it becomes an example of the type of generating station which, using low-cost coal derived from modern mining techniques, could prevent nuclear power (see p 54 of this issue) from ever becoming a real coal competitor.

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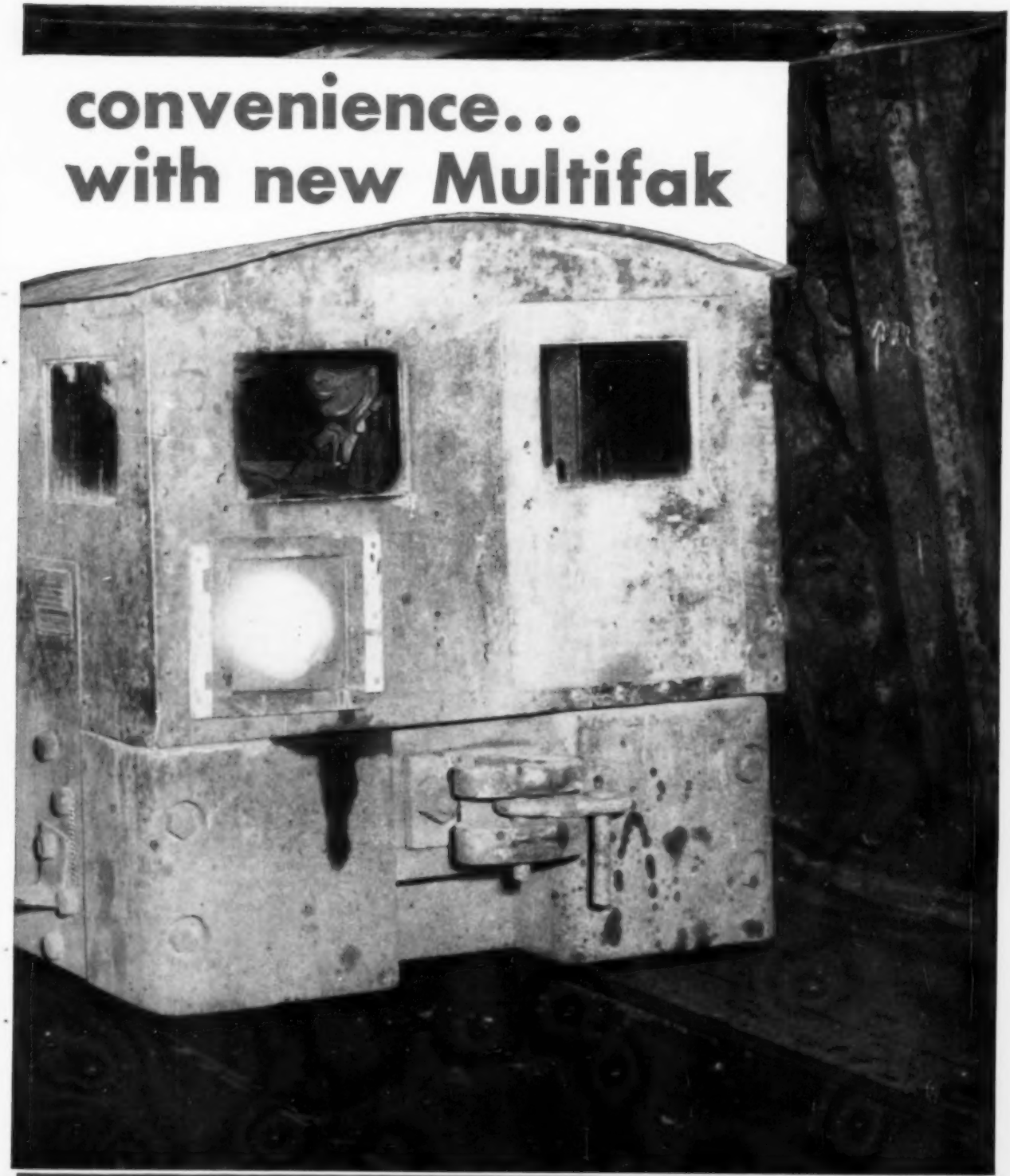

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Boone County Coal Company ..... (2)
Brule Smokeless Coal Company ..... (2)
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Gay Coal and Coke Company ..... (2)
Gay Mining Company ..... (2)
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Jacob's Fork Pocahontas Coal Company
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Harvey Coal Company ..... (2)
Inland Steel Company
Jewell Ridge Coal Corporation ..... (2)
Kentland Elkhorn Coal Company
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Liberty Coal Company
Liberty Elkhorn Coal Company
Majestic Collieries Co. ..... (3)
Mary Gail Coal Company
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West Kentucky Coal Company ..... (2)

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Dindo Coal Company, Inc.
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Gem Coal Company
Hanna Coal Company of Ohio .....(2)
Jefferson Coal Company
Lorain Coal & Dock Company .....(2)
Merrick Coal Co.
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Warner Collieries Company .....(2)

ILLINOIS

Bell & Zoller Coal & Mining Company .....(3)
Belle Valley Coal Company
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Chicago, Wilmington & Franklin Coal Company
Deer Creek Coal Company
Eddy Coal Company
Elk Coal Company
Freeman Coal Mining Corporation
Mid-Continent Coal Corporation
Moffat Coal Company .....(3)
Old Ben Coal Corporation .....(5)
Peabody Coal Company .....(3)
Pschirrer & Sons Coal Company
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INDIANA

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Fairview Collieries Corporation
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Snow Hill Coal Corporation .....(2)

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Arrowhead Coal Company .....(2)
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Clayton Coal Company
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Colony Coal Co. .....(2)
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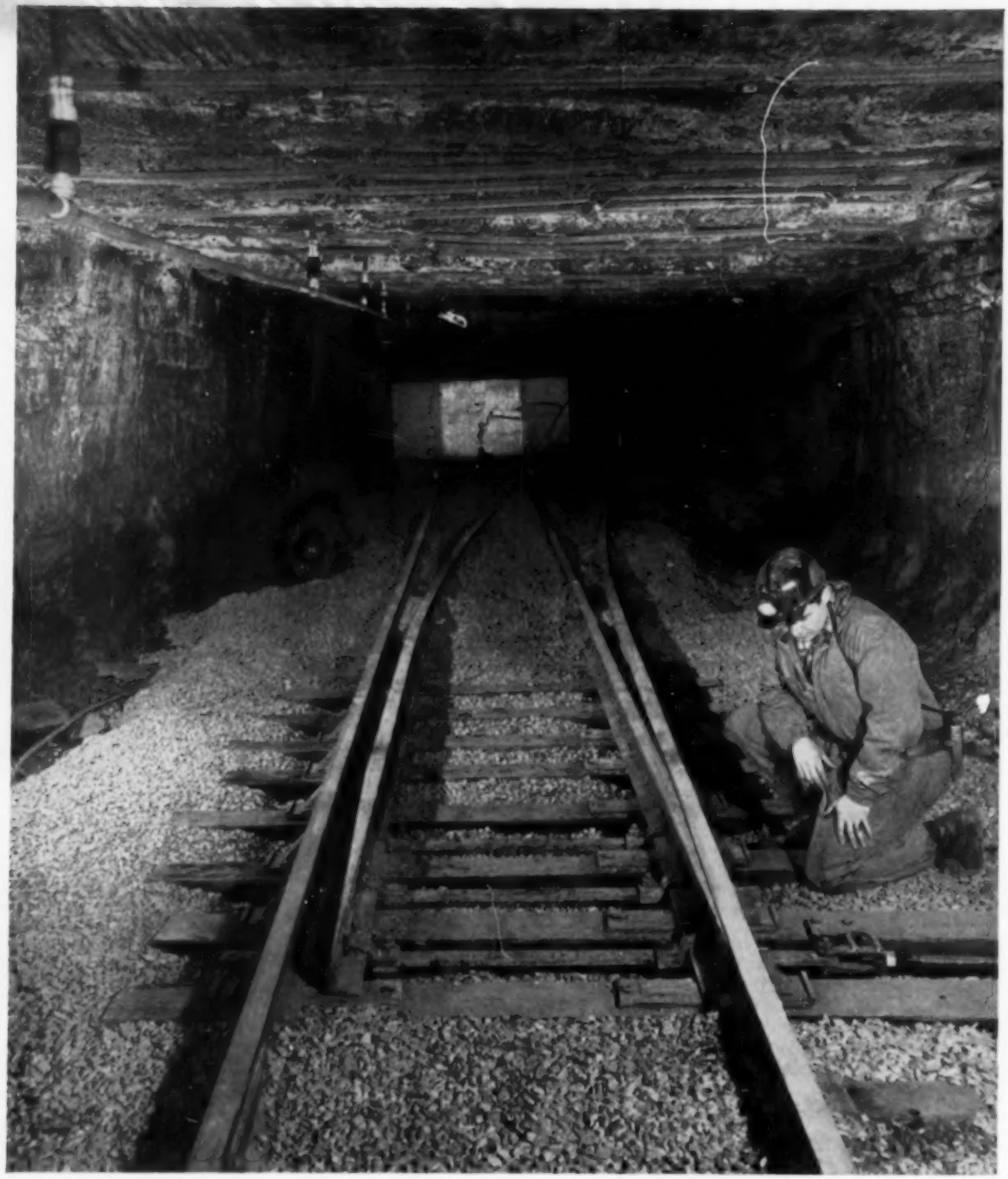

TURNING POINT? Let tonnages mount and haulage speeds accelerate, when you have heavy-duty, high-speed turnouts like this Number 8 at critical points throughout your system. This Bethlehem beauty boasts 85-lb rail and 16½-ft switch points. But chances are that any Bethlehem-manufactured trackwork, judiciously located on the layout, might mark a turning point toward more profitable operation. A Bethlehem engineer would like to elaborate on this thought. It wouldn't obligate you in any way nor take up much of your time. Got a few minutes?

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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

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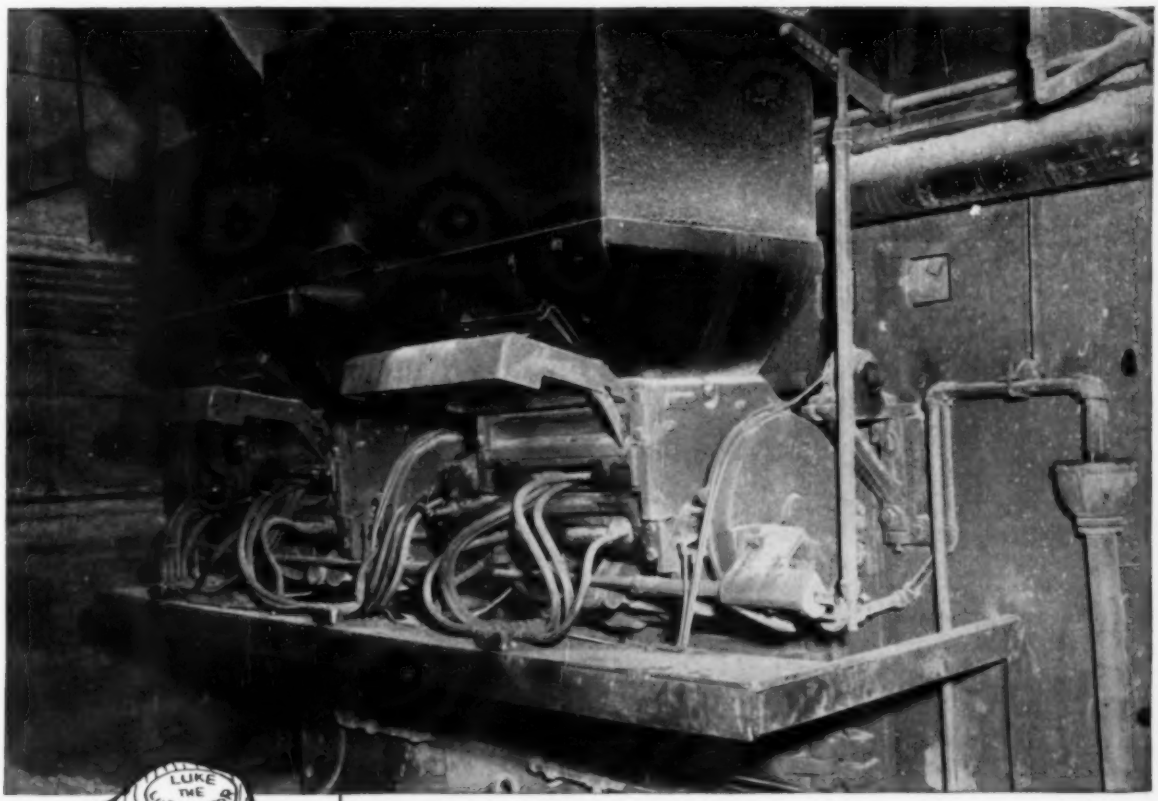

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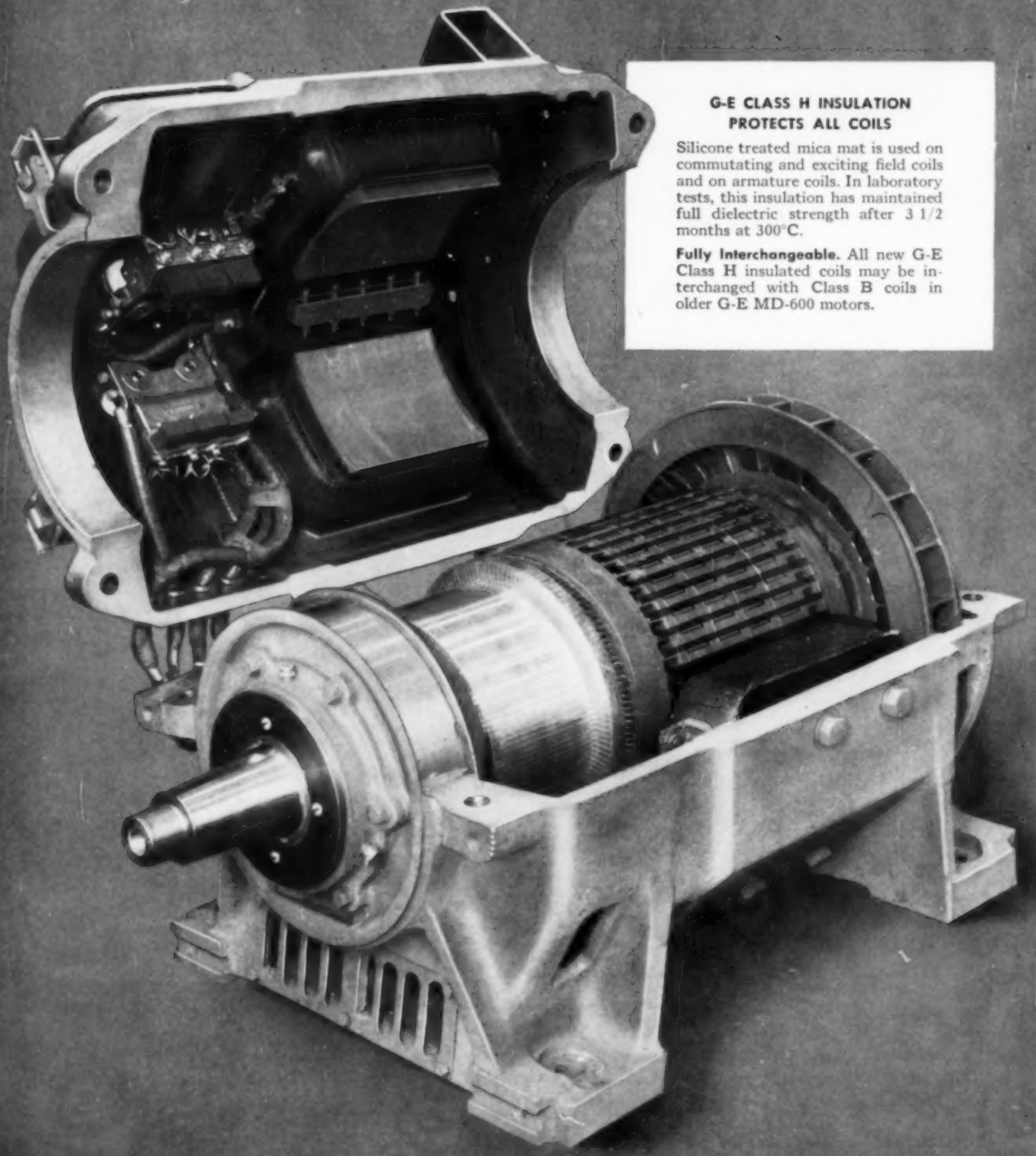

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Silicone treated mica mat is used on commutating and exciting field coils and on armature coils. In laboratory tests, this insulation has maintained full dielectric strength after 3 1/2 months at 300°C.

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BETTER FOR HEAVY DUTY. Auxiliary mill motors often encounter unexpected high ambient temperatures, unforeseen extended duty or emergency conditions. Any one of these can cause "roastouts" from temperatures higher than the insulation capacity. The new G-E Class H insulation will resist up to 50°C more than Class B, resulting in longer motor service.

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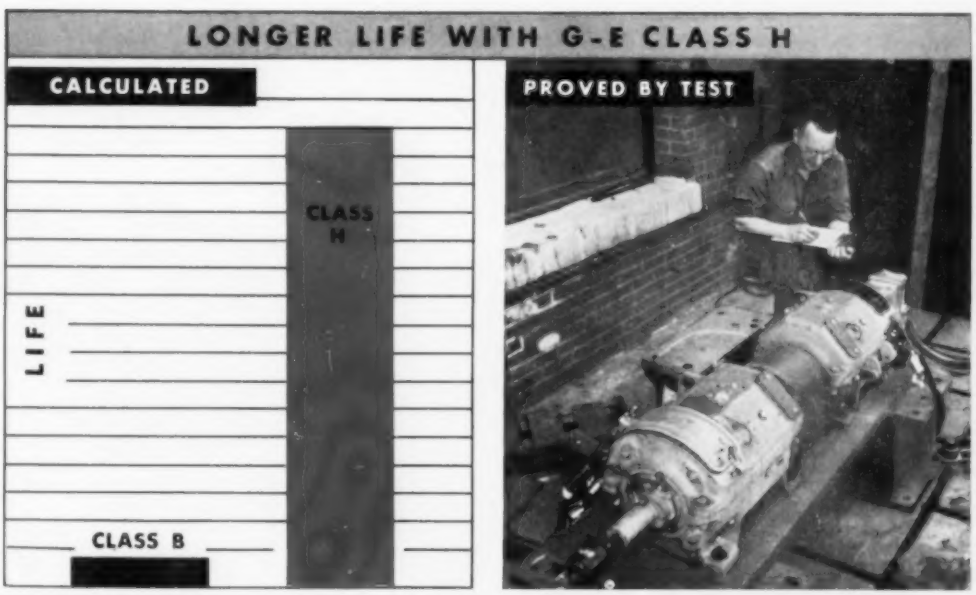

ENGINEERING STUDIES indicate that under identical operating conditions new G-E Class H insulated coils in MD-600 motors will last up to *32 times* as long as conventional Class B coils. Insulation failure may be eliminated as the limiting factor in continuous auxiliary mill motor service.

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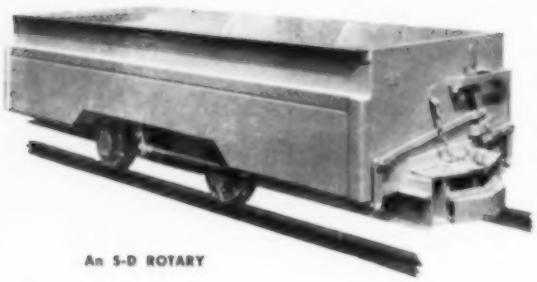

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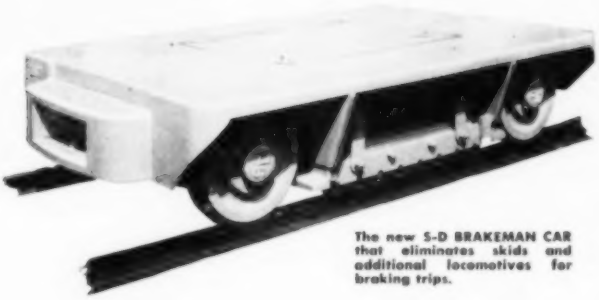

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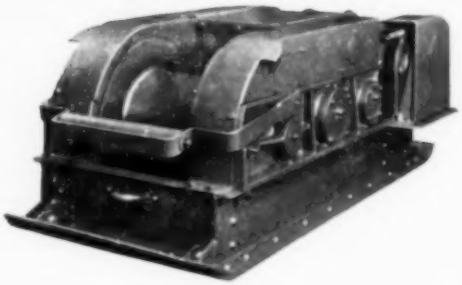
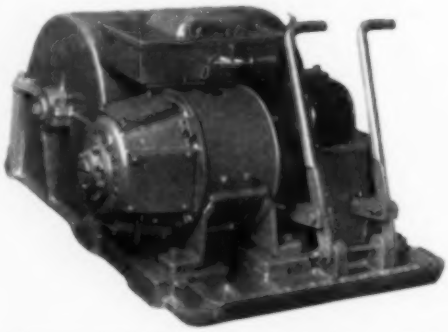
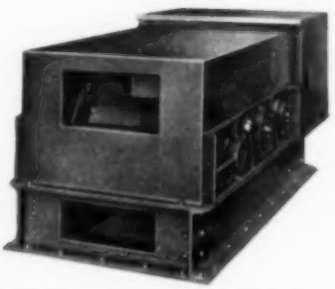
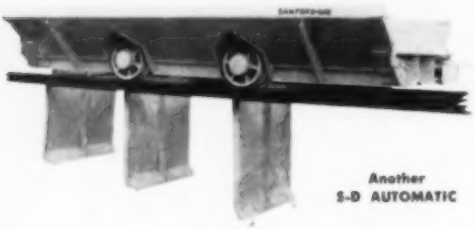
Our Brownie Line helps you select the right hoist to meet your requirements. It's the industry's most complete line—rigging hoists, room hoists, haulage hoists, car-spotting hoists, layer loading hoists—hoists for every haulage use. Be sure you obtain the right hoist to meet your requirements. Investigate the Brownie Line. Also investigate our Oil Spray Outfits, Gathering Pumps and Pump Accessories, Blowers, Brownie Rerailers and Derailers. BROWN-FAYRO DIVISION, Sanford-Day Iron Works, Telephone 3-4191, Write P. O. Box 1511, Knoxville, Tenn.

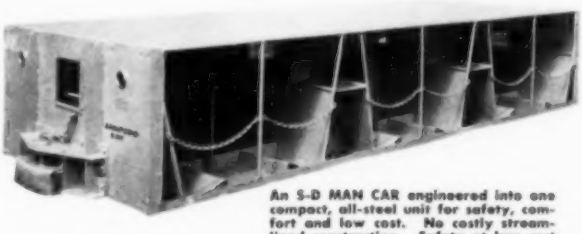




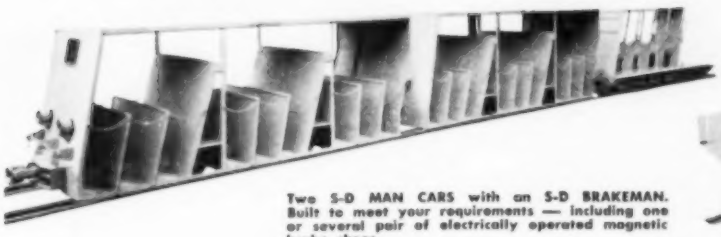




Another S-D AUTOMATIC



An S-D MAN CAR engineered into one compact, all-steel unit for safety, comfort and low cost. No costly streamlined construction. Safety at low cost was the important factor in this car — the best possible buy for safe and efficient personnel transportation.



Two S-D MAN CARS with an S-D BRAKEMAN. Built to meet your requirements — including one or several pair of electrically operated magnetic brake shoes.

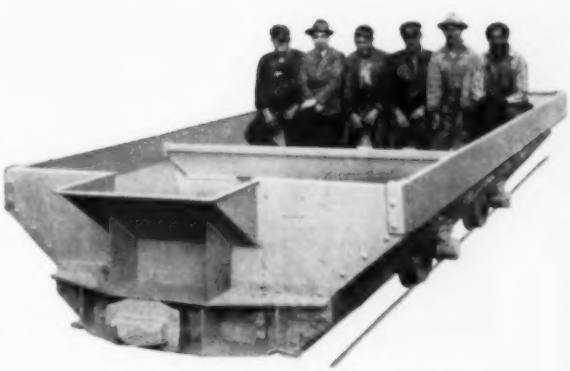
A big capacity 4-wheel S-D AUTOMATIC is shown at right. Designed and built for extra years of service — ½" plate in the doors, for instance. Level full capacity 277 cu. ft. Surcharge capacity 338 cu. ft. Might be the car you need.

Market for mine cars

Below is another big capacity 4-wheel S-D AUTOMATIC. Negotiates 50 foot minimum radius curve when coupled. Note overlapping ends, permitting continuous belt loading without spillage between cars.

IS THERE SOMETHING special you need in mine cars—a feature to meet your particular requirements? You probably will find the answer in our plant. Down through more than 50 years of car building experience we have solved the major problems of mine haulage.

Regardless of the type car you need, we build it . . . cars so constructed to give you more years of service with the least maintenance. Shown here are but a few of scores of all types S-D Mine Cars regularly being built for coal mines. All are designed and constructed to give superior service for the lowest dollar. Whether you need one car or 101, don't hesitate to get one of our engineers into your mine—face-to-face with your problem. With this type of cooperation, plus our facilities and capacity to build any type mine car of any size, any haulage problem in your mine can be solved. *SANFORD-DAY IRON WORKS, Telephone 3-4191, P. O. Box 1511, Knoxville, Tenn.*



An S-D 8-WHEEL AUTOMATIC with four bottom dumping doors. Others have been designed and built with six doors. These S-D eight-wheelers also feature exclusive S-D "Twin Safety Latches" and "Safety Seal" against dust leakage.

Sanford-Day IRON WORKS

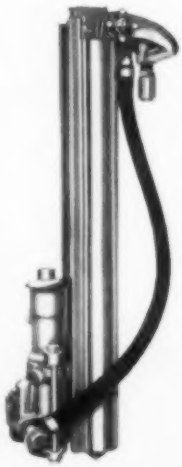
KNOXVILLE • TENNESSEE

AND BROWN-FAYRO DIVISION

MINE CARS, All Types - PRECISION WHEELS - "Brownie" HOISTS CAR RETARDERS - SPOTTERS PUMPS - OIL SPRAY SYSTEMS

28" FEED

46" FEED



64" FEED

Remove Snap Ring

Remove Chuck

THE LE ROI-CLEVELAND S20 VAC-NU-MATIC STOPER

All models available in either SAV-A-CHANGE or Socket Type Chuck

● The new CLEVELAND S20 VAC-NU-MATIC dust collecting stoper is available in 3 feed lengths to suit any working height down to a 26" seam. *It will produce a 30" hole in a 26" seam without using coupled steel.* The 28" feed weighs 69 lbs. complete. Any model may be used either hand held or jumbo mounted. VAC-NU-MATIC bits are fast and free cutting and eliminate all stuck steels. Dust collection is positive even in wet top. Chucks may be replaced without dismantling the machine, using only a pair of snap-ring pliers. Cuttings are removed at the chuck housing and do not pass through the machine. Write for bulletin RD32 or let us demonstrate in your own mine.

For sales, service, information or demonstration in Pennsylvania and West Virginia contact: Schroeder Brothers — 3116 Penn Ave., Pittsburgh, Pa. or Acme Machinery Co. — Williamson, W. Va. In the Birmingham district contact Equipment Service Co., 617 North 9th St., Birmingham, Ala., or contact us direct from anywhere.

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

RD-75

Patented and Patents Pending

21230

Cuts and loads up to
8 TONS OF COAL PER MINUTE

There's only one safe way to buy a mining machine. Instead of rolling out price lists, roll up your sleeves and check *production* ability. How does your present equipment compare with the Goodman Boring Type Continuous Miner's cutting and loading rate of up to 8 tons of coal per minute? With its high percentage of coarse coal cut and loaded? Chances are it falls far short . . . for the Goodman Miner is the highest tonnage-producing mining and loading machine available today.

But don't forget to check maneuverability, too. Here's what the Goodman Miner can do:

- **Suitable for all development work, including 90° crosscuts, and for complete pillar extraction.**
- **Follows seam irregularities by vertical or sideways tilt of cutting element.**
- **Cutting elements retract for tramming clearance at top, bottom and sides.**
- **Full hydraulic control of all machine movements for ease of handling.**

New Goodman Rope Belt Conveyor easily and quickly extended to keep pace with advance of working face.

Goodman Boring Type Miners are also far superior to conventional mining equipment in promoting concentrated working areas—requiring fewer man hours and less supervision—substantially reducing costs of installing, maintaining and extending roadways, roof support and power lines.

In short, the Goodman Miner is a profitable, self-amortizing investment from any viewpoint. Available for seams from 4'4" to 8'. For a more detailed description of its features and benefits, write for Catalog No. G-107 . . . no obligation.

GOODMAN
MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Check

PRICE PER POUND OF LIFT CAPACITY

Here is a sound way to measure the value of excavators and cranes. Compare machines on the basis of price per pound of lifting capacity. You'll very quickly learn which machine offers you the biggest production capacity per dollar of equipment investment.

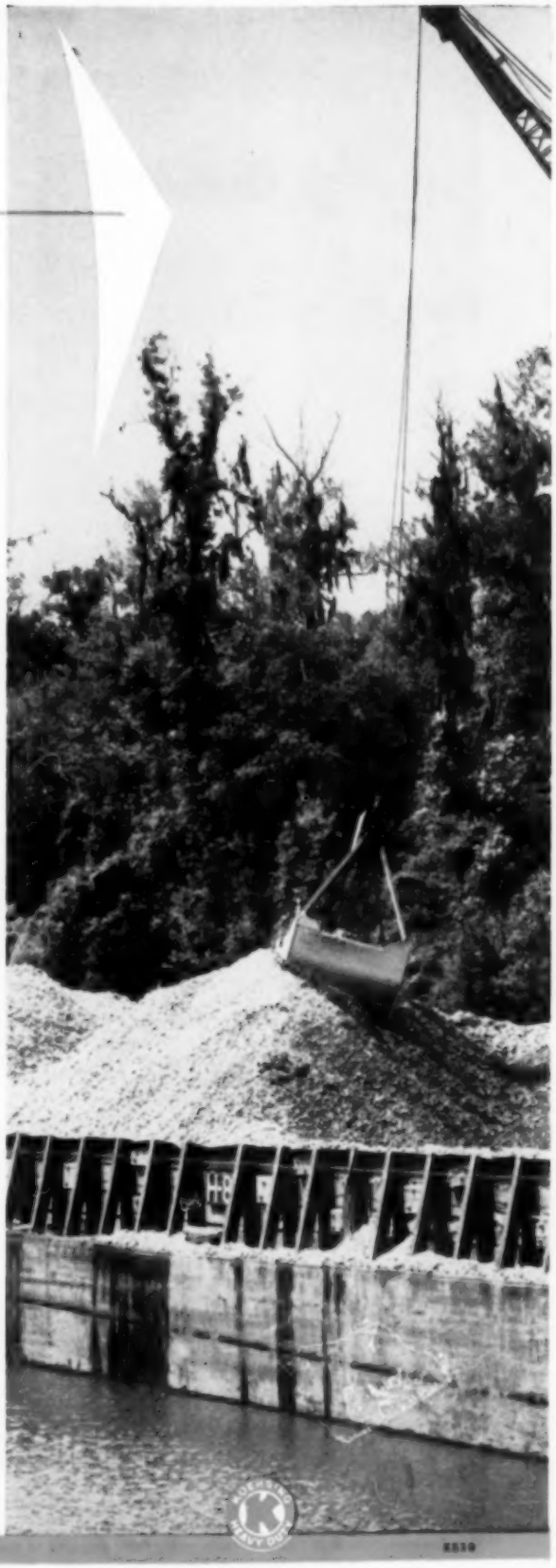
Remember — lift capacity is *work capacity*. Obviously, the machine with heaviest lift rating not only picks up larger crane loads. It also has more strength, speed and stability with every excavator attachment to handle bigger loads on a faster operating cycle.

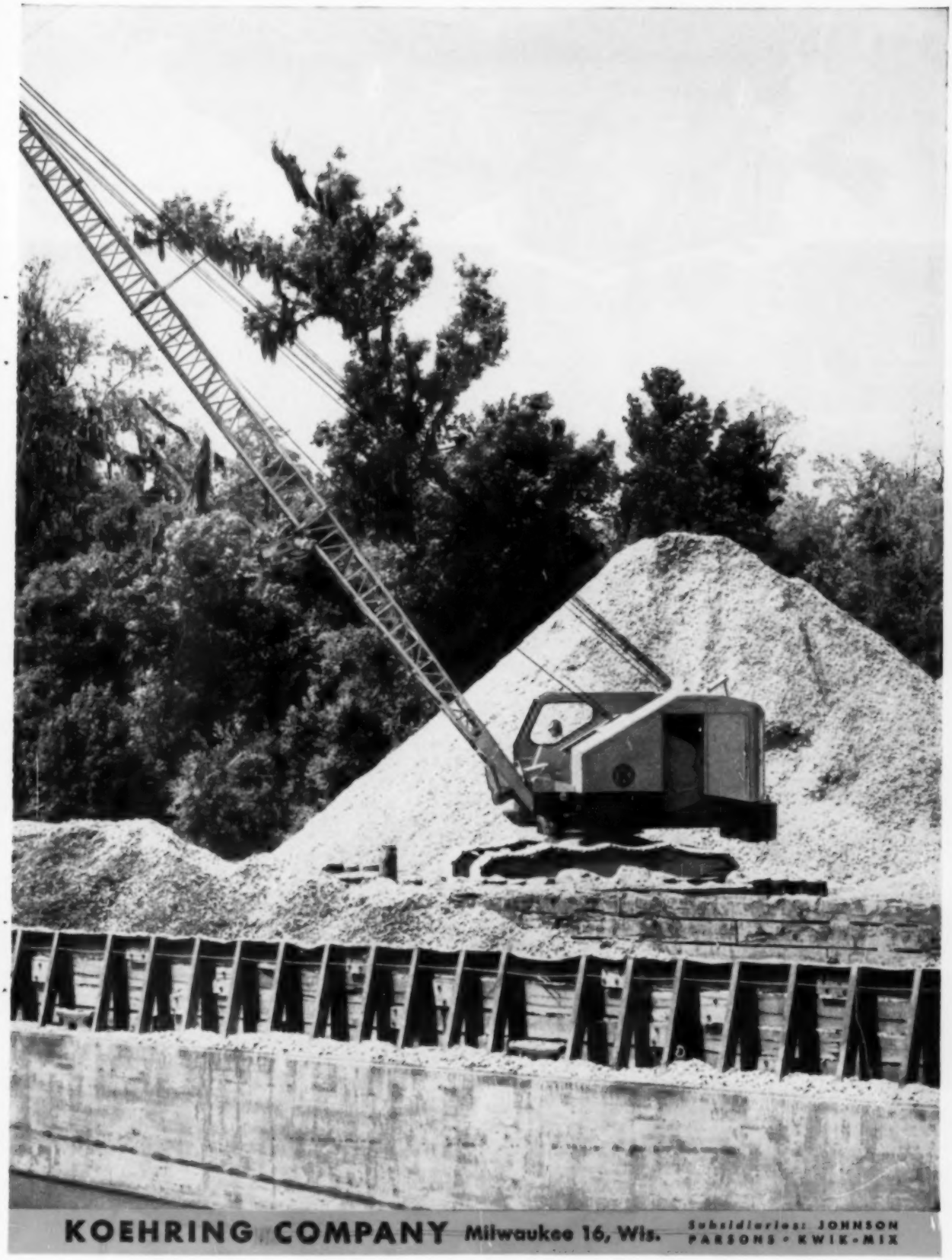
Check the Koehring lift ratings shown below — then ask your Koehring distributor to give you the figures on price per pound of lift capacity.

compare for yourself:

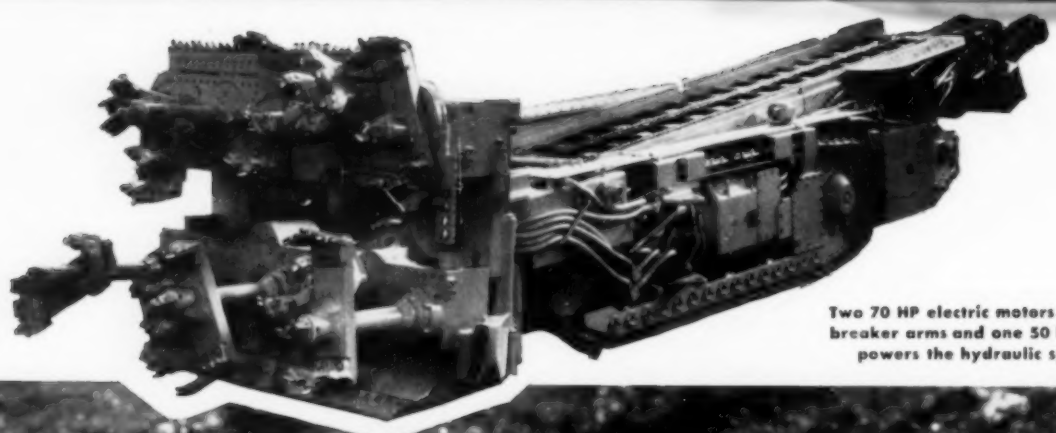
KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load)		PRICE PER POUND OF LIFT CAP.*
205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
304 ON RUBBER	¾-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	?
405 CRAWLER	1-Yd.	40,000 lbs.	40-foot boom at 12-ft. radius	?
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
1005 CRAWLER	2½-Yds.	159,000 lbs.	50-foot boom at 12-ft. radius	?

Figures available on request—ask your Koehring distributor to see them.

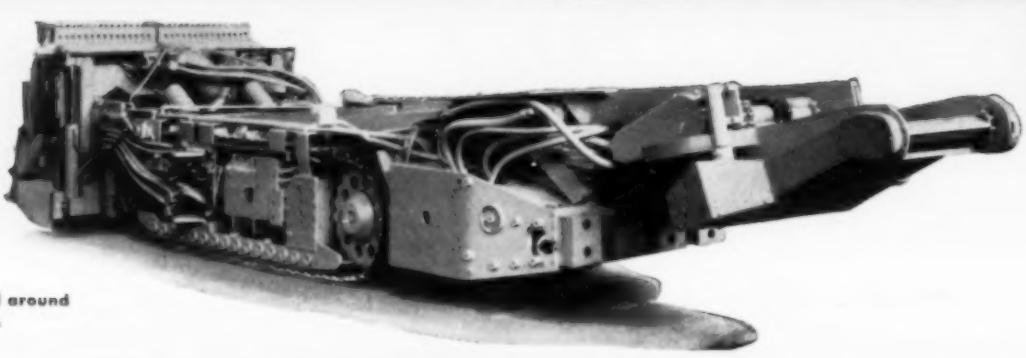




KOEHRING COMPANY Milwaukee 16, Wis. *Subsidiaries:* JOHNSON PARSONS • KWIK-MIX



Two 70 HP electric motors drive the breaker arms and one 50 HP motor powers the hydraulic system.



The Colmol can be turned around in its own length.

Up to 100 tons per man-shift...

continuous mining in medium height veins

with the

76-B JEFFREY COLMOL®

(PATENTED)

A COLMOL working a West Virginia seam with a crew of seven has produced 900 tons of coal in a single shift—an even better record than the 100-ton per man-shift figure normally set as a goal for this powerful Jeffrey continuous mining machine. Evidence again of the high tonnage production possible with the Colmol.

Ten sturdy rotating cutters attack any coal seam ranging from 46½" to 72" in height, according to the model chosen. All coal in an area 9'8" wide is brought down, swept into the conveyor, and is discharged at the rear. The cutter arms operate at a speed of less than 60 RPM, breaking off the coal and producing a screen consist comparable, in most seams of coal, to conventional mining.

This 70,000-pound giant advances steadily on long, wide crawlers with little noise, vibration or dust. The head can be raised, lowered or tilted to follow irregularities in the seam. The discharge conveyor swings 31 degrees to either side, to make loading into a shuttle car easy. All adjustments are hydraulic and can be made instantly and accurately. Controls are centralized for convenience and safety; once they've been set, they need very little attention, reducing operator fatigue.

The Colmol is sturdy, suiting it to the toughest mining jobs. Operating parts, both electrical and hydraulic, are readily accessible. Thus servicing, minor repairs and adjustments can be made at the face, holding downtime to a minimum.

If you're thinking of new continuous-mining equipment, ask to hear Jeffrey's story on the 76-B Colmol. Its high productive capacity and the long, trouble-free service it provides will make it a moneymaker for you.

Write to: Mining Sales Division, The Jeffery Manufacturing Company, Columbus 16, Ohio. District Offices in: Beckley, Birmingham, Chicago, Denver, Pittsburgh, Harlan, Salt Lake City.

3 MODELS

HEIGHT OF CUT:
46½" to 55"
50½" to 64"
56½" to 72"

WIDTH OF CUT: 9'8" approx.

JEFFREY

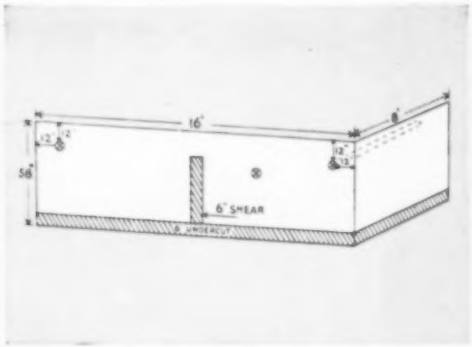
MINING, CONVEYING, PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

"'Monobel'® C gives us consistently satisfactory performance"

reports Grover L. Asbury, Superintendent, Pocahontas Fuel Co., Itman, W. Va.

"Consistently satisfactory performance is one of the keys to successful operation of a modern high-production coal mine. An important part of satisfactory performance is the maximum production of good-sized lump, which reduces our loading and cleaning expense. We consider Du Pont 'Monobel' C a product that is giving us such performance in our mine."

OPERATOR tamps charge of "Monobel" C into hole drilled in face. Three 8′ holes in 58″ high Pocahontas seam are loaded for each shot.



MINE OFFICIALS and Du Pont technical service men cooperated to develop loading pattern (diagram). Application of pattern is shown in photograph of a typical room at the Pocahontas mine: 16′ wide face is undercut 8′, center sheared and loaded with Du Pont "Monobel" C, 1¼″ x 7″.

HEAVING ACTION of Du Pont "Monobel" C breaks and throws large, easy-to-handle lumps of coal away from the face. Loading is quickly and efficiently accomplished, and the room is soon ready to be prepared for another shot.

SHOT has sheared rib clean and left no overhang, reducing time needed for preparation of next shot. With fines minimized, cleaning operations are rapid. Your production schedule will be speeded up, too, if your permissible is Du Pont "Monobel" C.

Every mine owner wants a permissible with a high batting average when it comes to bringing in top percentages of coarse coal. That's why "Monobel" C is so popular in the field. It scores every time—firm lump, low ash. Give it a tryout in your mine. For complete information, contact the Du Pont representative in your district, or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

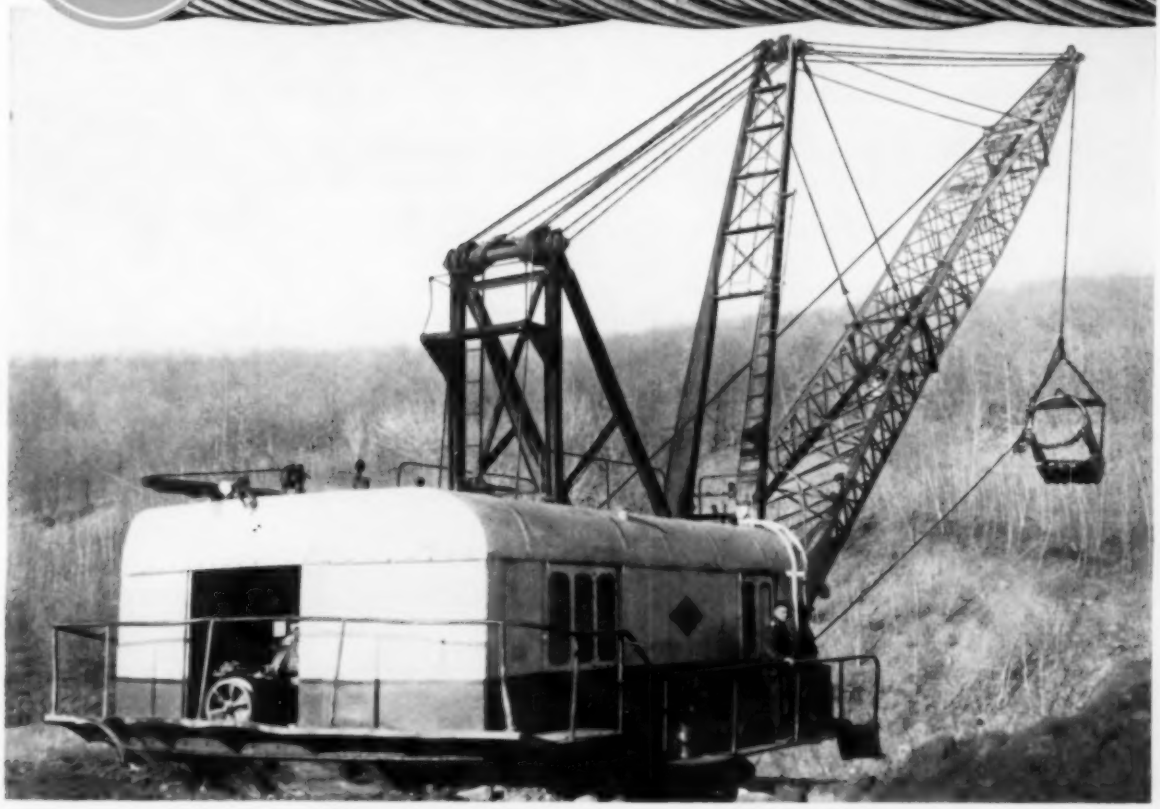
DU PONT
PERMISSIBLES
Blasting Supplies and Accessories

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

an ACCO product

American Cable TRU-LAY VHS | 15% STRONGER



New VHS Dragline Lasts 73% Longer

Draglines on the excavator above, used in coal stripping operations at the Kingston Mining Company, Plymouth, Pa., get really rough service. The best Improved Plow Steel lines formerly lasted only 700 hours.

Now, however, lines of new TRU-LAY VHS are averaging 1,250 hours —giving 73% longer service life.

Records like these are being duplicated by VHS Draglines all over the country. For new VHS is tougher—more wear resistant. And it has all the advantages of preformed construction.

Your American Cable Distributor has TRU-LAY VHS *in stock now. See him or write to the nearest American Chain & Cable Company Office.*

STRONGER AND SAFER

New VHS is 15% stronger than Improved Plow Steel, which was the strongest available until now. Its additional strength enables you to handle heavier loads with the same diameter line. And it gives you a higher factor of safety during the entire service life of the rope.

FOR SHOVEL HOIST ROPES AND SLUSHER ROPES, TOO

TRU-LAY VHS was developed particularly for the toughest applications in the mining industry—draglines, shovel hoist ropes and slusher ropes. It stands up better under the rough treatment these ropes necessarily get.

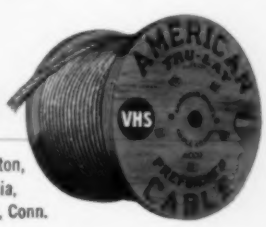
LESS "DOWN TIME"—CUTS COSTS

Because it is tougher and more wear resistant, TRU-LAY VHS rope lasts longer, costs less to use and cuts "down time" of equipment for wire rope replacement.

TRU-LAY VHS ropes are easy to order. Just ask for TRU-LAY VHS Shovel Hoist Ropes, Slusher Ropes or Draglines, in the size you want. You don't need any complicated specifications.

ACCO American Cable Division
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.



A PICTURE REPORT OF

INTERNATIONAL POWER

Boosting job production everywhere

"Tops for stripping overburden," reports Maurice Stein, Superintendent for Elliot Coal Mining Company, Philipsburg, Pennsylvania, of his company's TD-24's. "We've used two for three years now . . . find they give maximum output with very low maintenance. Our operators especially like their ease of handling and good balance. We also like their planetary steering system which lets our operator safely work on steeper terrain." Right now, rigs are removing 40 ft of shale and clay to uncover a 24-inch vein of "C" seam bituminous coal.

For utility work around pit or plant, 39½ dhp International 300 can be equipped to do most any task. Here, rig loads and unloads trucks. With other attachments, "300" plows snow, blades roads, loads bulk materials, digs ditches, mows grass, tows trailers. Rig has 10 speeds forward to 16.7 mph, develops 4,379 lbs pull.

Fast on job, fast between jobs—Handling all tractor work in a quarry near Denver, Colorado, 200 hp TD-24 saves time by driving from job-to-job at 7.8 mph. Output, 2200 tons of 1¼-inch stone per 8-hour shift, is taken from crusher by International-powered belt conveyor, background, then stockpiled by TD-24. Unit also does all stripping.

"Ideal for dozing rock," says Paul Weaver Supt for Joe Wenke Quarries of this veteran TD-14A. "We use it continuously for shovel and quarry-floor cleanup. Performance has been excellent. Downtime is way down due partly to rugged construction, partly to prompt parts delivery and service from our International distributor." Quarry, located at Toledo, Iowa, produces 200 tons of 1-inch road stone per hour.

3000-ft cycle every 3 min is the record of Western Construction Co.'s "55" Payscraper. This includes time for TD-24 to push-load 10 bank yds of ripped caliche. Payscraper's fast-loading ability makes it ideal for stripping overburden . . . high ratio of horsepower to loaded weight, oversize air brakes speed hauls up and down steep grades. Photo was taken near El Paso, Texas.

Loader does job too tough for shovel—In an assignment which dramatically illustrates the tremendous break-out International Drott can bring to bank-loading, Al Pangia's TD-14 rips up a 150-yd concrete filling station driveway in Camden, N. J. Engineers say a ¾-yd shovel could not have done the work . . . yet TD-14 broke and loaded the slab unassisted.

International
makes every load a pay load

INTERNATIONAL HARVESTER

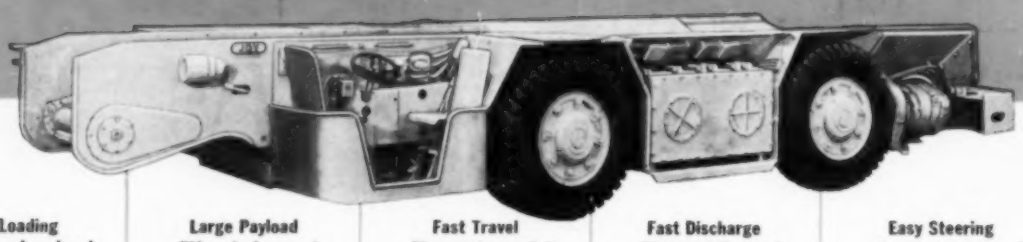
Industrial Power

A machine size for every job . . . see your nearest INTERNATIONAL DISTRIBUTOR for details.

PAYSCRAPERS 13 yds. and 18½ yds.
CRAWLER TRACTORS 8 Models . . . 40 to 200 hp
DIESEL, GAS ENGINES 10 Models, 16½ to 200 hp
WHEEL TRACTORS 6 Models . . . 9 to 59 dbp

ALSO: International Drott Loaders . . . International Scrapers, Bottom-Dump Wagons . . . and International Superior Pipe-Boom Tractors.

There's a Valuable Combination



Fast Loading

Sides and ends of the specially designed 9-SC body are just right for easy positioning behind loader boom or surge car. Two-speed, resistance-free operation of motors makes loading easy and fast.

Large Payload

The job-engineered 9-SC packs up to 8 tons of coal per trip. Its rugged body rides on axles, wheels and tires all rated well within load requirements. It is built right to carry big loads dependably.

Fast Travel

Tramming a full load at 3.6 mph, then returning empty at over 4 mph, the Joy 9-SC with 10 HP motors keeps your coal on the move. No time lost due to skidding, tangled cable, burned out resistors, etc.

Fast Discharge

The 9-SC, with hydraulic adjustable discharge, gets rid of a full load in less than a minute. Powerful motors and specially designed, heavy-duty conveyor chain and flights make sure loads continue to empty fast.

Easy Steering

Joy pioneered power steering underground, long before autos had it. The 9-SC now has power-boosted steering that's better and easier than ever. Mechanical steering system is provided, just in case it's needed.

Simple Control

Easy-to-reach controls operate the 9-SC through Joy's positive, trouble-free Magnetax Control. You steer with a familiar wheel from a comfortable seat; brake with your right foot; tram with your left.

Positive Braking

Big airplane-type, hydraulic disc brakes control all four wheels and stay effective, smooth and easy despite coal dust, oil and water. No need to adjust; can be relined in just a few minutes with ordinary tools.

Proved Performance

Nearly 20 years ago, Joy introduced the world's first shuttle car. The 9-SC is one of the most successful in the line, consistently doing a good, dependable job and setting new records in many mines.

Low Maintenance

Basically a modified version of the field-proved 10-SC, the improvements in the 9-SC give you even greater assurance of *continued* service without breakdowns . . . keep it on the go, and maintenance low.

Less Hauling Cost

The 9-SC is a performance-proved car, not a "drawing-board dream" or a test unit. It's ready to work immediately, and many mines have already reported operating costs of much less than 2c a ton.

# of Haulage Advantages for you in the JOY 9-SC SHUTTLE CAR

THE JOY 9-SC Shuttle Car is an ideal unit for the operator who wants high-production haulage at lower first cost—or for use in mines where the service conditions may not be tough enough to require the extra ruggedness of the popular JOY 10-SC.

In the 9-SC, you get a permissible unit that offers many of the best features of the heavier 10-SC, at considerably less cost. The 9-SC Shuttle Car handles payloads up to 8 tons, trams loaded at 3.6 mph, and discharges in 40 to 45 seconds. It is 7′8″ wide and available in 43½″ or 49½″ basic heights—with 4″, 6″ or 8″ sideboards, and 34″, 46″ or 58″ discharge lengths for 250V or 500V-DC operation.

Here is a field-proved shuttle car that can tram a full load up or down a 12% grade, turn on the grade without skidding, and handle coal or rock with equal ease. It has simple, familiar controls—the driver steers with a wheel and brakes with his right foot, going or coming back.

As further assurance that the 9-SC was designed for continuous service under tough conditions, it has the same heavy-duty universal wheel drive units with positive drive (no differential) as the model 10-SC . . . the same heavy-duty spur gear reducers and constant velocity universal joints on the traction drive . . . the same rugged, equalized drag link steering (no tie rods)—and many other identical features, both standard and optional.

Check up on the 9-SC for dependable haulage in medium to thick seams. For *any* haulage problem or other underground requirement, JOY Mining Equipment offers you the field-proved way to boost production and reduce costs. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 41-1

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

WSW CL5918-41

Only 9 men per shift are needed to operate $1,300,000 Yankeetown Dock Corporation installation. F-M Diesel Engine, Caterpillar switch engine, car tipper, breaker plant, 115 coal cars, gob truck and conveyor are lubricated with STANOLITH Grease MP.

This "3 in 1" Indiana coal mining group chooses STANDARD

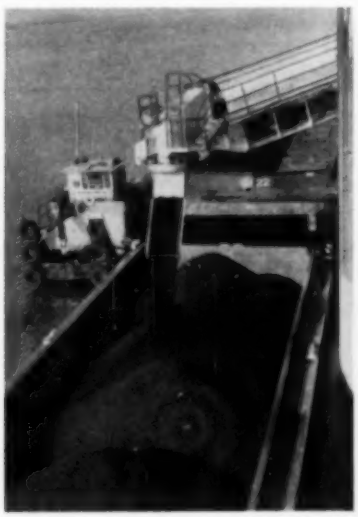
Elva Nordhorn (right), assistant superintendent, Yankeetown Dock Corporation and Standard Oil industrial lubrication specialist Bill Griswold inspect car tipper. Bill Griswold is one of two experienced lubrication specialists in Standard's Evansville office who provide technical service. Bill is well qualified for the job. He has 30 years with Standard.

Two Indiana mines and their processing-shipping unit use STANDARD lubricating oils, fuels and greases; get three-way benefit.

Victoria and Wright Mines and Yankeetown Dock Corporation, in Southern Indiana, comprise one of the world's top-flight coal producing operations. This mining group delivers a million tons of coal a year to Clifty Creek power plant near Madison, Indiana. The power plant, in turn, produces electric power for an atomic energy installation nearby.

Both of the mines and the service facility depend upon Standard Oil Company for fuels, lubricating oils and greases. Across the page are three reasons why:

This 4 foot wide conveyor belt transports coal 1,105 feet from breaker plant to Ohio River loading dock. Loaded barges move up river to Clifty Creek power plant at Madison, Indiana. Conveyor system is lubricated with STANOLITH Grease MP. Conveyor operates two shifts per day the year 'round.



1. Standard's experienced mine lubrication technical service.

On-the-spot lubrication technical service is provided the mines and dock by two experienced men from Standard's Evansville office. These industrial lubrication specialists know mine lubrication. They are backed up by technical help from the Standard Oil headquarters office and laboratories. Headquarters for the mines and dock are in Chicago, Kansas City, St. Louis and Indianapolis. Standard Oil has offices in these cities with industrial lubrication men on hand to give assistance whenever needed. Mine and dock operations thus receive complete lubrication technical service support.

2. Standard's high quality and complete line of fuels, lubricants and greases.

Lubricants and fuels that keep equipment in service and minimize maintenance, contribute much to making this–or any–installation a profitable operation. The quality lubricants and fuels the mines and dock unit buy from Standard deliver top performance day after day, rain or shine, hot or cold, spring, summer, fall, winter.

3. Standard's fast delivery and dependable service.

Warehouse facilities in Boonville, less than 5 miles away, serve the mines and dock. Stocks of recommended lubricants warehoused there, back up inventories at the site. Stock control holds requirements to necessary levels. Fast delivery from refinery assures an uninterrupted flow of required oils, fuels, greases; provides the mines and dock with the third big reason for buying from Standard.

Could your mine profit from services such as these provided by Standard Oil? Perhaps Standard fuels and lubricants could give a new look to your operations. Find out. Call your nearby Standard Oil industrial lubrication specialist. There is one near you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

At the Wright Mine pit, Marlin Carter (right), foreman, and Standard Oil lubrication specialist Oscar Daussman discuss lubrication. Oscar has been helping customers with lubrication problems all of his 30 years at Standard. Customers look to Standard for this kind of help.

Marion 5561 stripper removes overburden, Marion 151M loading shovel loads coal haulers at Victoria Mine. Two mines and dock operate as one integrated unit. Facility is one of the world's largest, most modern coal mining and handling systems.

One of Victoria Mine's 25 ton Euclid coal haulers unloads into waiting coal car. Trucks haul coal to railroad spur, railroad transports coal to breaker plant. Whole system uses Standard lubricants and fuels.

STANDARD

STANDARD OIL COMPANY
(Indiana)

How Dodge Manufacturing Corporation designs pillow blocks that pack more capacity in less space

THESE design features make Dodge-Timken pillow blocks ideal for use where big load capacity in small space is needed: (1) All-steel construction gives extra strength. (2) No space-consuming special thrust devices are needed, because the Timken® tapered roller bearings used take *both* radial and thrust loads in any combination. (3) Timken bearings have high load capacity because of their *full line contact* between rollers and races.

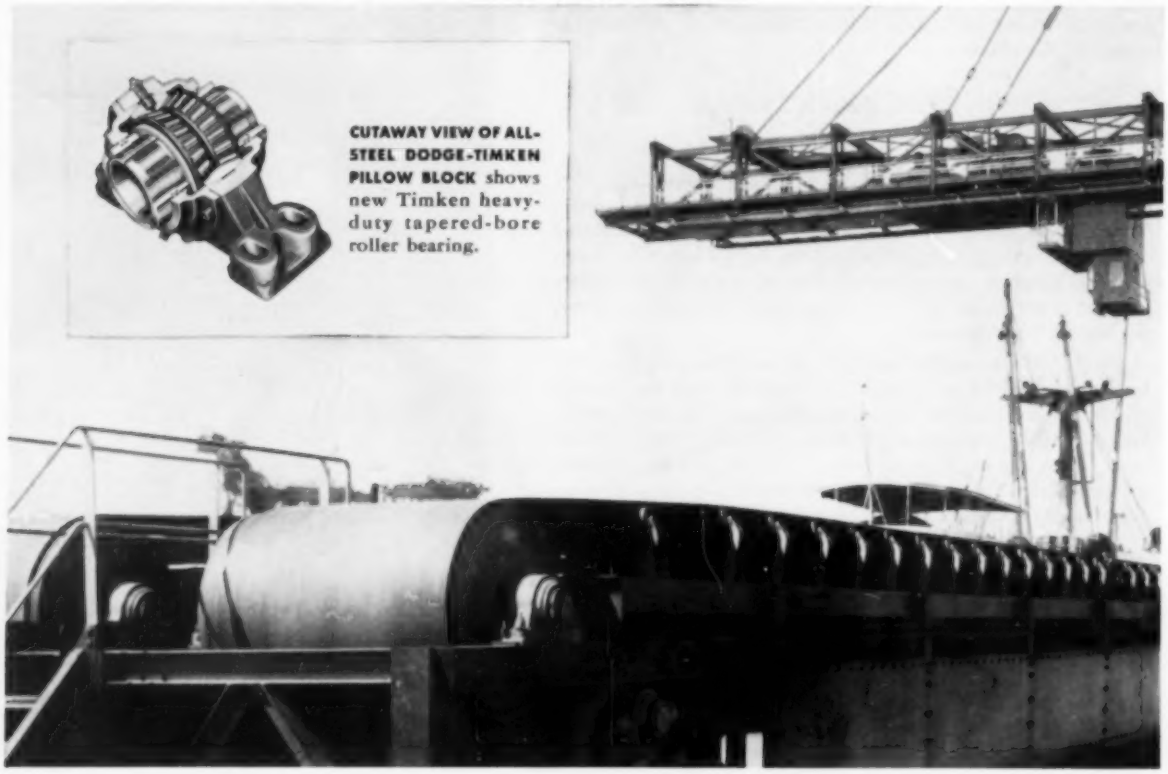
The Dodge-Timken pillow blocks shown below support all head, tail and take-up pulleys on this conveyor belt which transports ore from ships to railroad cars. Timken bearings take the shock loads because all rollers and races are made of case-carburized steel, with tough, impact-resistant cores under hard, wear-resistant surfaces.

The Dodge-Timken All-Steel pillow blocks on this conveyor utilize a special new type of Timken heavy-duty, self-aligning tapered-bore roller bearing. The pillow block is one of many expansion and non-expansion types made by Dodge Manufacturing Corporation for general power transmission and machine applications; such as Type E, Double-Interlock, Type C and Special-Duty blocks. All are factory-sealed against abrasive dust and dirt.

Be sure you get all the advantages of Timken bearings when you buy or build pillow blocks, or any equipment. The Timken Company is America's only bearing manufacturer who makes its own steel. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

CUTAWAY VIEW OF ALL-STEEL DODGE-TIMKEN PILLOW BLOCK shows new Timken heavy-duty tapered-bore roller bearing.



TIMKEN

TAPERED ROLLER BEARINGS

DESIGN LEADERSHIP

The first Timken tapered roller bearing was produced in 1898. Since then the one-piece multiple perforated cage, wide area contact between roller ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◐ AND THRUST ⊣◐⊢ LOADS OR ANY COMBINATION ⊣◎⊢

OHIO EDISON

uses 2 Tournatractors on 82,000 ton stockpile

OHIO Edison Company stockpiles, compacts, and feeds 20,000 tons of bituminous coal a month with 2 Tournatractors at their Gorge Plant in Akron.

The coal, brought in by truck and rail, is first pushed 300 to 500 ft. to an 82,000 ton stockpile where it is held in reserve. The Tournatractors move 2½ yards per push. Dozing is done up 0 to 20% grades in third gear (7 mph) . . . return is made in fourth. Rolling action of big rubber tires thoroughly compacts the coal . . . reduces danger of spontaneous combustion.

From the stockpile, Tournatractors push the coal into a hopper for consumption.

The older Tournatractor was bought in the fall of 1948, and has now worked over 10,000 hours.

The newer Tournatractor, driven to the job in the spring of 1950, has worked almost 7,000 hours.

Both machines are still running on their 4 original rubber tires.

This excellent efficiency and steady, big-yardage output proves that Tournatractors have what it takes to deliver dependable, trouble-free performance year after year. Ask your LeTourneau-Westinghouse Distributor to show you Tournatractor in action so you can judge its advantages for yourself.

Tournatractor crosses tracks, pavement, curbs, without planking. Low-pressure tires do no damage to surface . . . sharp corners, rocks do no damage to the 16-ply tires. In spare time, unit builds driveways, clears parking lots, spots railroad cars, plows snow.

Operator sits up front ahead of engine . . . can see where he's going, what he's doing. Low-pressure tires take up the jars of continuous dozing . . . electric controls reduce end-of-day fatigue. With constant-mesh transmission, speeds are changed at the flick of a finger.

Tournatractor—Trademark T-460-CH-b

FREE . . . A new 28-page book, showing all the ways Tournatractor will increase your production while lowering your costs. To get your copy, simply fill out coupon. Mail today to LeTourneau-Westinghouse Company, Peoria, Illinois. There is no obligation.

Send to: LeTOURNEAU-WESTINGHOUSE COMPANY, Peoria, Ill.

Your name _____

Title _____

Company _____

Address _____

Street, City, State

Want to cut mine machinery lubrication costs in 1956?

Whatever your problem, an Amoco mine lubrication engineer will help you solve it. His lubrication-survey is yours for the asking, and his technical know-how can help you cut lubrication costs per ton of coal. Give him a chance to prove it. Call your local Amoco office.

AMOCO LUBRICANTS

...SURE • SAFE FOR MINE MACHINERY

AMERICAN OIL COMPANY AMOCO

Here's how 6 owners cut costs with Tournapull Rear-Dumps

Huron Portland Cement Company, Detroit, formerly used a narrow-gauge railway system for hauling shale to their mill at Alpena, Michigan. To cut costs and speed the operation, they now have 2 LeTourneau-Westinghouse Model C Rear-Dumps doing the entire job.

2,700 tons daily on 1900′ cycles

In typical operation, a 3-yard shovel loads these Rear-Dumps with 18 tons of shale in 1¾ minutes. Despite adverse grades of 4 to 7% on the haul, each unit takes only 7 minutes to complete 1900′ cycles. The 2 haulers regularly deliver 13 to 14 loads (234 to 252 tons) per 50-minute hour. Company records show an average production per 11-hour shift of 150 loads (2,700 tons). This is enough shale to produce 30,000 barrels of cement daily, greatest output of any mill in the world.

It will pay you to try LeTourneau-Westinghouse Rear-Dumps, too. They are available in 9, 22, 35, and 50-ton capacities to fit your job. Get facts on performance . . . price . . . and delivery. Call us any time.

INDIANA LIMESTONE QUARRY
82,476 tons for 7.6c per ton

Dunn Limestone Co., Spencer, in 6 months hauled 79,923 tons of rock plus 2553 tons of limestone and fluxing stone with 2 "D's". Total costs for 1,932 hours were $7234 ($2760 wages; $3800 depreciation, insurance, taxes; $674 fuel, repairs). That's $3.74 per hour or 7.63c per ton hauled.

200,000-YD. W. VA. TUNNEL JOB
turns where trucks can't

Bates & Rogers Construction Corp., Chicago, teamed 2 D Rear-Dumps and 2 trucks to haul muck and shale for B. & O. railroad tunnel near Clarksburg. While trucks needed skid plate to turn inside 31′ wide tunnel, "D's" made 90° turns (in 12′4" radius) and easily maneuvered under shovel.

CALIFORNIA MOUNTAIN QUARRY
tried 1... bought 2 "C's"

Monolith Portland Cement Co. tried this one Rear-Dump; liked it so well they bought 2 more for hauling rock from the cramped quarters of their mountain-face limestone quarry. Working at altitude of 3800′, each "C" carries 16 tons per load . . . makes five 400′ cycles every 50-min. hour.

OHIO CLAY QUARRY
moves 100 tons of rock hourly

At U.S. Quarry Tile clay pit, Contractor Adolph Bockus, Canton, hauls 100 tons of overburden hourly with his 122 hp "D" Rear-Dump. Rig carries 9 to 9½ tons per load. Haul speeds average 14 mph over a 700′ haul (which includes grades up to 20%). Output, 11 trips per 50-min. hour.

PENNSYLVANIA COAL MINE
3 "A's" take place of 10 trucks

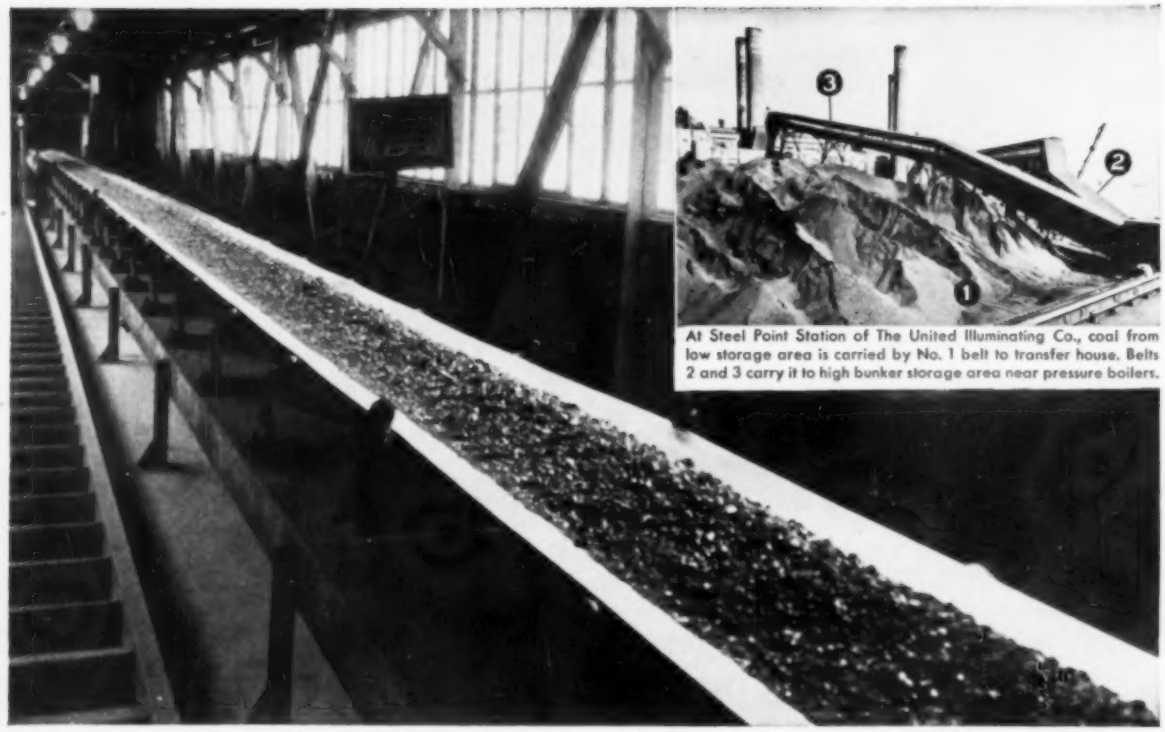
Colitz Coal Co., Pottsville, uses 3 "A" Rear-Dumps in place of ten 12 to 15-ton trucks. These big rigs carry 40 to 51 tons of overburden per load up 20% grades; over 2000′ cycles, make about 50 trips each per 7½-hr. shift. Says Owner Colitz, "These units have cut operating costs 40%."

Tournapull—Trademark Reg. U.S. Pat. Off. R-601-Q-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company



At Steel Point Station of The United Illuminating Co., coal from low storage area is carried by No. 1 belt to transfer house. Belts 2 and 3 carry it to high bunker storage area near pressure boilers.

15 years of abrasion, oil, weather –and 4000-foot neoprene belt system keeps rolling

Fifteen years of service and more than 4,000 feet of belt make the neoprene conveyor system at The United Illuminating Company plant in Bridgeport, Connecticut, one of the oldest large neoprene belt installations in the country. Three belts in the system have carried hundreds of thousands of tons of oil-sprayed coal, and they look as if they're ready for many more years of service.

That's because rugged neoprene shrugs off abrasion and oil, which the belt encounters daily. In fact, neoprene offers resistance to practically any deteriorating condition a belt faces—corrosive atmospheres, oxidation, cutting and flex cracking.

It all adds up to extended service life and big savings on belt replacement costs. So take a tip from the many coal operators who are profitably using neoprene conveyor belts above and below ground. Specify neoprene—it's the same tough material that is used to jacket your mine-trailing cable.

REMEMBER, OF ALL RESILIENT MATERIALS, ONLY NEOPRENE RESISTS ALL OF THESE CONDITIONS:

- Corrosive atmospheres
- Oils, solvents, most chemicals
- Electrolytic attack
- Heat and flame
- Sunlight and weathering
- Flex cracking
- Abrasion, cutting, chipping
- Oxidation and aging

NEOPRENE

The rubber made by Du Pont since 1932

DU PONT

REG. U. S. PAT. OFF.

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FREE! THE NEOPRENE NOTEBOOK. Every issue contains interesting stories about products made with neoprene. Actual case histories give you the facts about neoprene's longer service life. Clip this coupon to get on the mailing list.

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LOOK TO THE LEADER:

for the widest range of coal washers—

for the widest range of drying equipment—

for every engineering skill that

makes coal a better fuel

ask

the men who know coal
from the ground up

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MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

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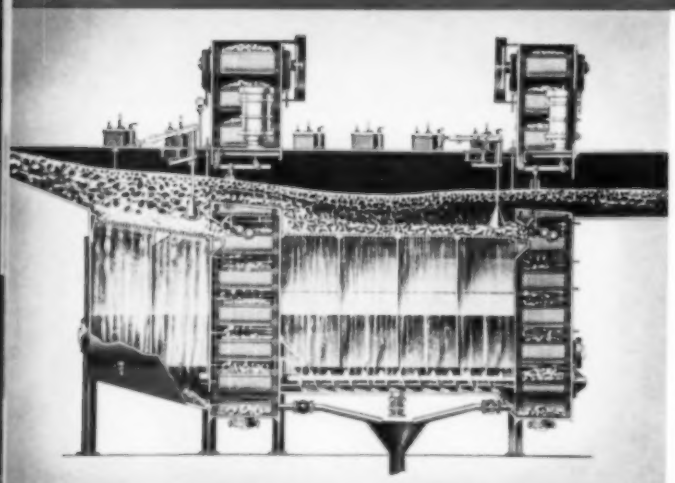
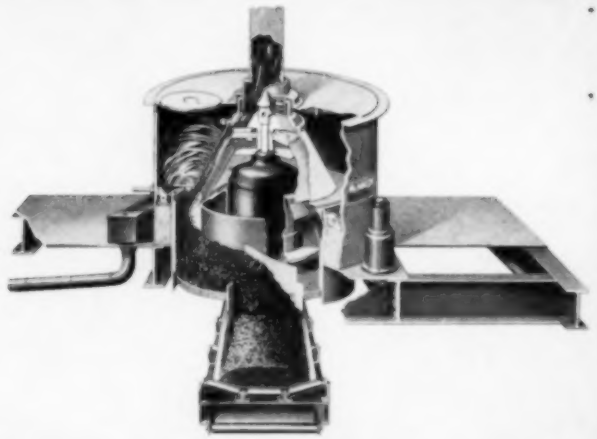


WASHING



DRYING

McNally Pittsburg "one-stop service" covers all your preparation requirements —Engineering Service that will give you the greatest returns for your preparation dollar—Manufacturing Facilities geared to deliver you time-tested, efficient Coal Preparation Equipment on schedule.

Whether you require spare parts — a plant addition or a complete new preparation plant, take the initial step to profits and fill in the attached reply card, today—We'll do the rest.

FOR LARGE PLANTS • SMALL PLANTS • PACKAGE UNITS •
ENGINEERING
EQUIPMENT
SUPPLIES

Gentlemen:

We need complete information on a complete new plant that will wash_____inches by 0 at_____ tons per hour and dry_____inches by 0 at_____tons per hour.

We also want information on the following special equipment:

Name_____ Title_____

Company_____

City and State_____

Have Sales Engineer call for further consultation.

C

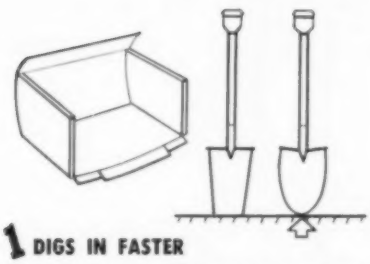
ask the men who know coal from the ground up

McNALLY PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

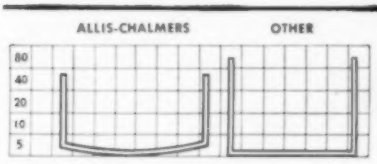
5 BIG REASONS WHY ALLIS-CHALMERS SCRAPERS move more dirt at lower cost

Check over these pull scraper features point by point. See for yourself how performance makes dollars when design makes sense.



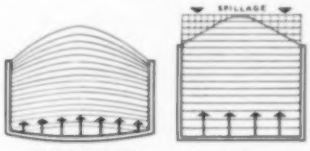
1 DIGS IN FASTER

The penetrating ability of a round-end spade helps illustrate how the curved and offset cutting edge on Allis-Chalmers scrapers concentrates all the tractor horsepower on the center section during initial penetration.



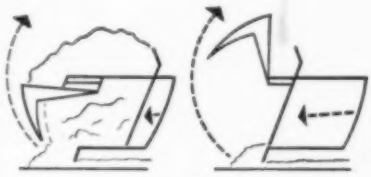
2 LESS LOADING RESISTANCE

Low, wide bowl plays an important part in ease of loading. Since loading resistance is largely determined by the height to which the load is built, the lower, wider bowl of an Allis-Chalmers scraper requires less time and power to get the same yardage as other scrapers.



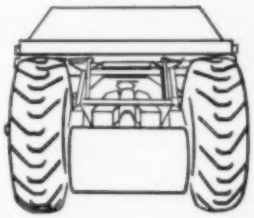
3 HEAPS AUTOMATICALLY

The combination of slightly deeper center cut and correctly angled cutting edge shapes the load as the scraper fills. The greater volume of dirt flowing into the center of the curved bowl "boils" forward, to the rear and to the sides, pulverizing the dirt, filling the voids and producing an automatically heaped load without excessive spillage.



4 POSITIVE EJECTION ASSURES EVEN SPREADING

With patented linkage, apron lifts, then moves forward and up as ejector pushes forward. High apron lift prevents any possibility of material's jamming. Anything that can be put into the bowl can be easily ejected.



5 HAULS, MANEUVERS EASILY

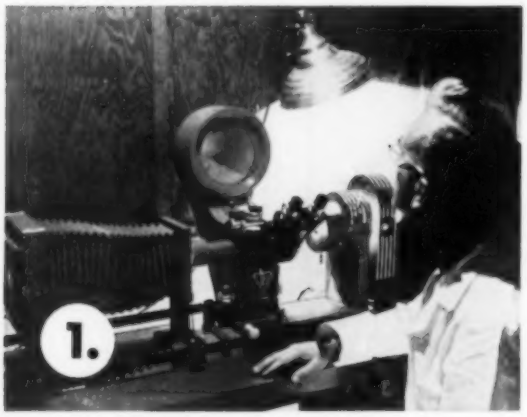
The extra wide, low bowl keeps center of gravity low, helps the scraper hug the ground for safety. Front running gear has ample clearance at all points. The two-to-three feet shorter wheel base permits easier maneuvering. Scraper can turn in its own length.

STRIPPING AND RECLAIMING IN ONE OPERATION. This Allis-Chalmers Model 315 Scraper strips overburden from the seam, then deposits and spreads it where the coal has been removed. It has a struck capacity of 15 cu yd (20 cu yd heaped) and incorporates all the job-proved advantages found in other Allis-Chalmers scrapers, 4.7 to 20 heaped capacities.

CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

Tuffy® Tips



Here Are Some Of The Steps Taken To Pre-Determine Tuffy Toughness And Assure Longer Rope Life

1. Metallographic Examination. Under powerful magnification, Union Wire metallurgists examine the microstructure of the steel in rods and wires to see that rigid specifications are met and maintained in processing.

2. Chemical Analysis Laboratory. Steel for Union Wire Rope is made to rigid specifications. Here rods and wire are chemically analyzed to make certain that the correct combinations of carbon, manganese, etc., are kept under control.

3. Designed by Union Wire Rope Engineers. This accelerated fatigue tester is equipped with sheaves from 8" to 24" permitting application of any bending stress. Tensile loads up to 12,000 lbs. are applied. Thus wire rope life under toughest fatigue conditions is pre-determined.

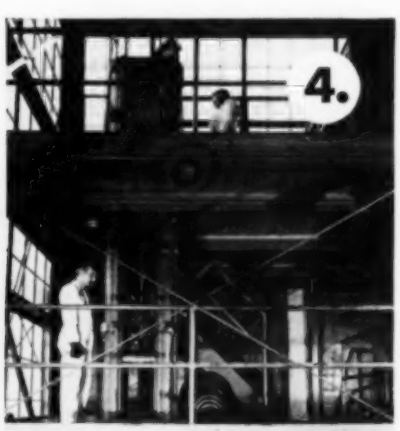
4. Rope Testing Machine. This 3-story high machine is designed to test and record the breaking strength of the rope when finished and ready for the customer.

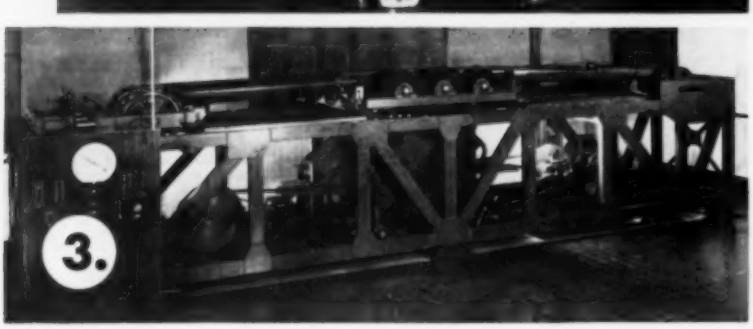
5. Static Flexibility Tester. The demand of machinery engineers toward smaller sheaves and higher speed made it necessary for Union Wire Rope Engineers to adapt this standard machine in order to test static flexibility.

6. Wire Tensile & Torsion Tester. In tension and under torsion, this machine tests wires to see that they measure up to the extraordinary high level of strength and toughness mandatory in Union Wire Rope.

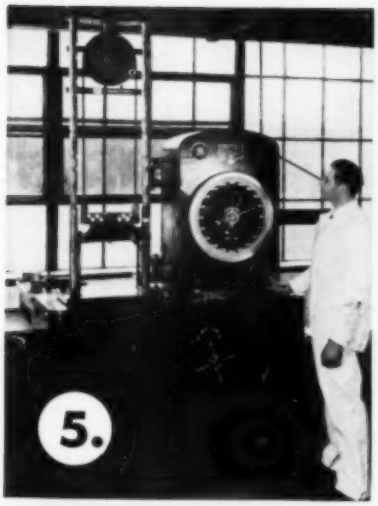
7. Another View Of Accelerated Fatigue Tester. Shows simultaneous testing of three different wire rope constructions. Here, in days, ropes are subjected to punishment equal to weeks or months of hard service.

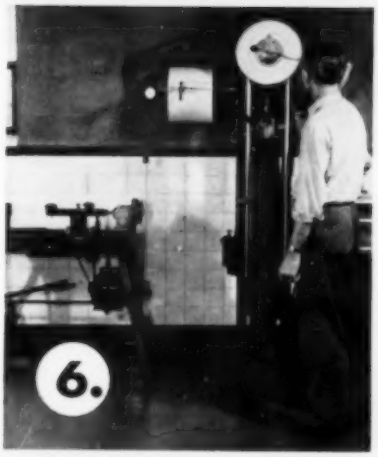
8. Wire Fatigue Testers. The fatigue strength of wire rope is the sum total of the fatigue strength of the wires in its construction. Here, the wires in tension and bending are tested for fatigue strength.

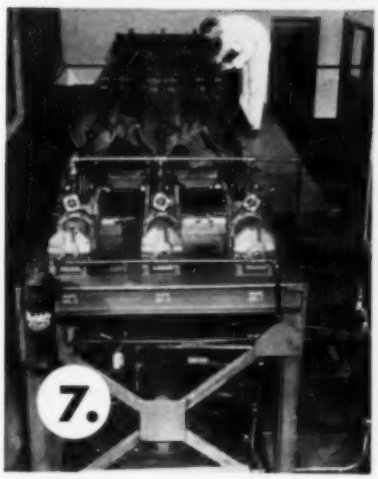


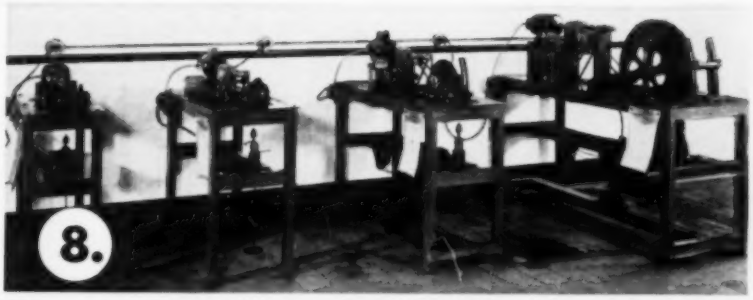


How Research Puts Longer Service Life Into WIRE ROPE









When you specify one of the Tuffy Wire Ropes, you can say Tuffy and forget complicated specifications

Tuffy Dragline

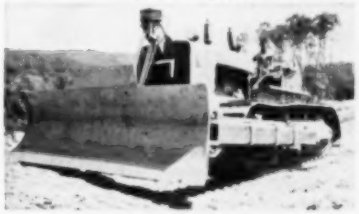
Has the built-in extra stamina, flexibility and abrasive resistance needed for longer service in rugged mining work. Helps move more material per rope.

Tuffy Scraper Rope

Flexible enough to withstand sharp bends, yet stiff enough to resist looping and kinking when slack. Plenty tough to fight off drum crushing. On easy-to-mount reels.

Tuffy Slings

9-part, machine braided wire fabric construction is extra flexible, extra strong. Resists looping, kinking. Straightens without material damage.



Tuffy Slusher Rope

Rigid, non-collapsing to eliminate drum crushing. Elastic and flexible to take shock loads and to better withstand abrasive wear in tough slusher loading.

Tuffy Dozer Rope

Designed to take the punishment of small winch drums and small sheaves . . . the shock of blade manipulation under toughest going. In 150′ reels for easy mounting on dozer.

Your Tuffy Distributor Works For You

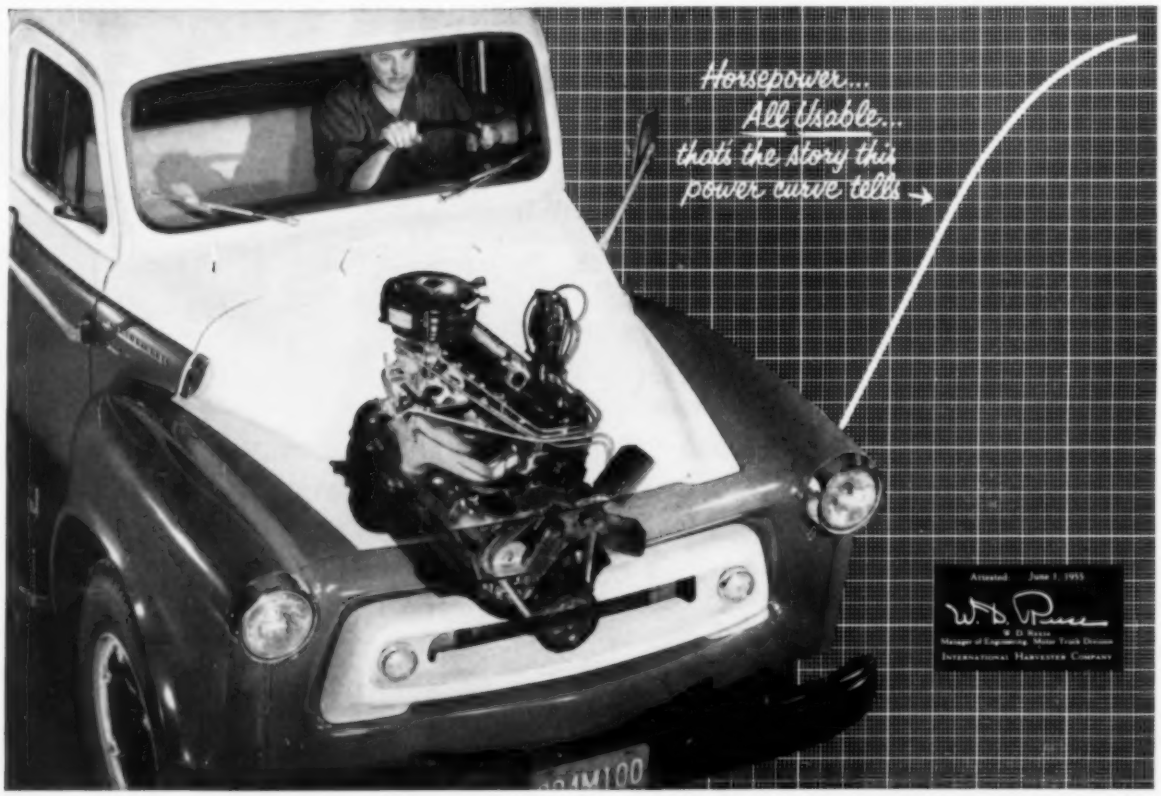
He's the man who can help you find a fast answer to all your wire rope problems. He's also the man who often knows as much about some requirements of your equipment as the men who made it. He's the man who's eager to supply the kind of service that will hold your patronage. Feel free to call on him anytime.

union Wire Rope corp.

2130 Manchester Avenue Kansas City 26, Missouri

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

It's usable horsepower that counts!



Many passenger car type truck engines have to rev up to high speeds to pull their loads. They strain at the job—cost big money in wear and repair. INTERNATIONAL all-truck engines turn at relatively low rpm—deliver high usable horsepower at normal road speeds, for peak performance, long life, BIG money savings.

Internationals give you power without strain at safe, economical rpm to save you the BIG money!

Rated horsepower figures don't tell the whole story of truck performance.

Wise truck buyers want to know *more* than rated horsepower. They want to know what actual *usable* horsepower they are going to get to pull capacity loads at normal, legal speeds—without undue engine strain.

Usable horsepower—that's the point to keep in mind when buying trucks.

INTERNATIONAL engines deliver high usable horsepower at economical, wear-reducing speeds. Because they are built for use in *trucks*, with no compromise with passenger car design.

You get the usable power you need, plus longest truck life, every driver comfort and convenience. See your INTERNATIONAL Dealer or Branch for trucks exactly right for your job—all-truck built to save you the BIG money.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

In the world's most complete truck line, there are trucks for every job. More than 200 basic models from 4,200 to 90,000 lbs. GVW—conventional and COE, 4-wheel, 6-wheel, four-wheel-drive—in thousands of variations for exact job specialization.

INTERNATIONAL® TRUCKS

All-Truck Built to save you the BIG money!

Motor Trucks • Crawler Tractors • Industrial Power
McCormick® Farm Equipment and Farmall® Tractors

There's more in this barrel for you...

Dr. R. T. Edwards testing products to fight corrosion caused by fingerprints on precision metal parts.

MORE CONTINUOUS RESEARCH

to help you improve production and cut costs!

When you specify "Socony Mobil," you get petroleum products backed by *more continuous research* than those of any other oil company! This means products which are *continually improved* in quality and performance—*new* products when needed. Equally important . . . these complete research facilities are available to *you*—to help improve your production and lower your unit costs.

Socony Mobil products are also backed by *more* field engineers serving industry . . . *more* services for analyzing petroleum products in use . . . *more* on-the-job training of your personnel in correct product application . . . *more* approvals from machine builders . . . *more* practical experience—90 years!

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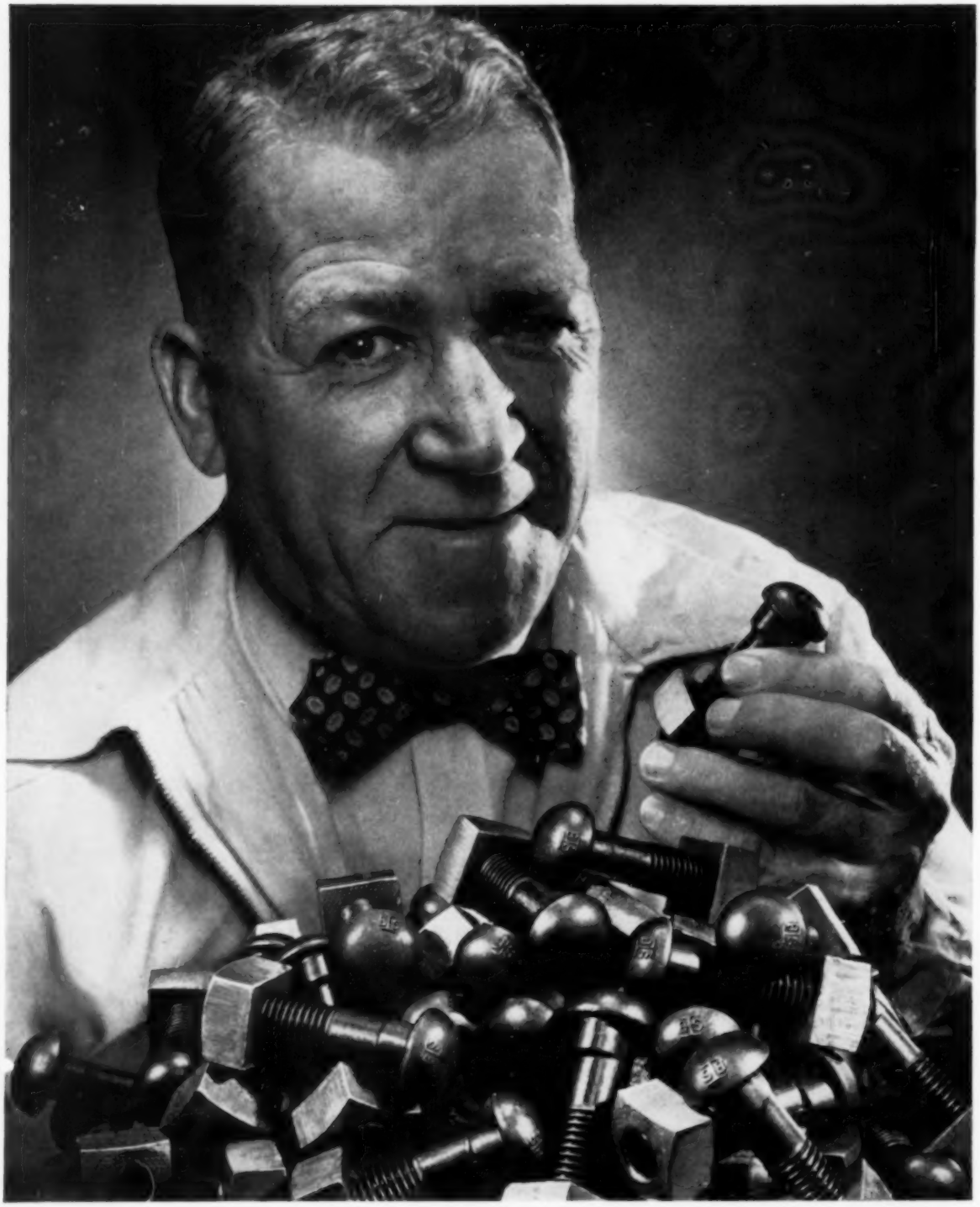

"Why do we like Bethlehem Track Bolts? Because of their strong necks, sharp, rolled threads, and well-formed heads. They all add up to a good holding job."

Spikes and machine bolts, too!

BETHLEHEM STEEL

Delivery from Stock in every coal mining area...

ROOF BITS

Firthite "Blue Bits" for roof drilling are made in 3 styles: RDL for light uses and very soft roof rocks; RDH with extra heavy duty insert to resist gage wear for most difficult roof drilling; RDS (slotted) for faster drilling of medium to hard roofs. All are water channeled for either wet or dry work.

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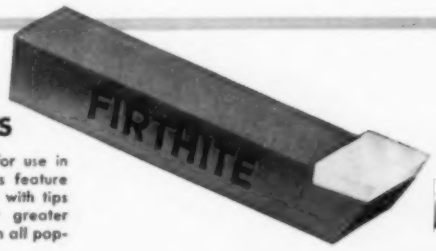
Firthite "Blue Bits" for rotary drilling available in 3 styles:—D with either square or hex shank for use with any standard drilling equipment; DV (illustrated) for faster and easier hand held drilling.

MACHINE BITS

Firthite "Blue Bits" for mining machines include bit design, style and grade for every need from light to rugged condition on continuous mining equipment.



FINGER BITS

Firthite "Blue Bits" for use in standard drill heads feature two-surface brazing with tips set in recesses for greater strength. Available in all popular sizes.

FIRTHITE "BLUE BIT" MINING TOOLS

Increased Distribution in Eastern Kentucky

Greater availability of Firthite "Blue Bits" from field stocks in Bell, Clay, Harlan, Knox, Leslie, Perry and Whitley Counties has now been assured by the appointment of McComb Supply Company, Harlan, Ky., as an authorized Firthite "Blue Bit" distributor. All necessary grades, sizes and styles are stocked for immediate delivery . . . in roof bits, drill bits, machine bits and finger bits.

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Mr. Tooley says—

"Firthite 'Blue Bits' are better because Firth Sterling makes *both* steels and carbides. Tool steel shanks and Firthite Carbide inserts are perfectly matched by one manufacturing source for maximum quality."

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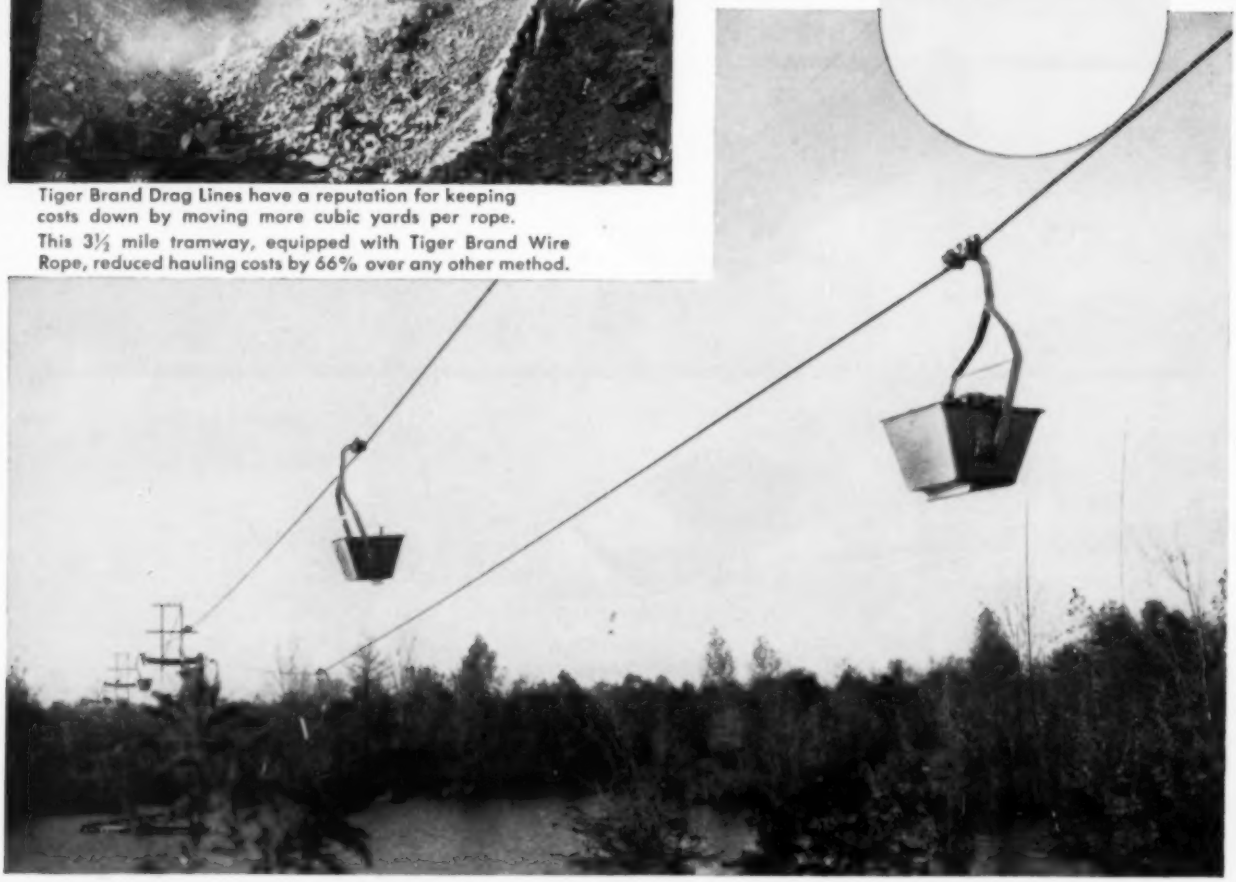
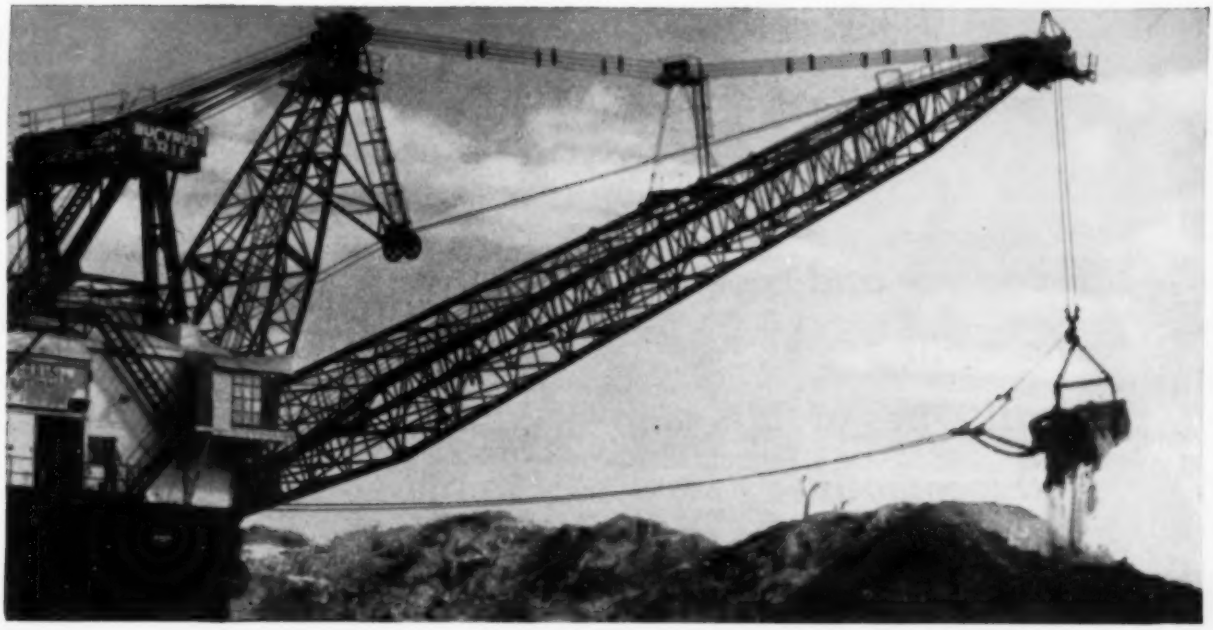
OR HAUL IT



Tiger Brand Drag Lines have a reputation for keeping costs down by moving more cubic yards per rope. This 3½ mile tramway, equipped with Tiger Brand Wire Rope, reduced hauling costs by 66% over any other method.



Dipper hoist ropes take a beating from abrasion, shock loads and constant bending. That is why you need a rope that's engineered for the job — Tiger Brand.

BY AIR... Tiger Brand delivers top yardage per dollar spent for wire rope

When you are moving materials in a big way, the cost per cubic yard may be a deciding factor in the type of equipment and wire rope you select. Whether you use shovels, draglines or tramways, the problem is to pick the rope that will give the best possible service on your job.

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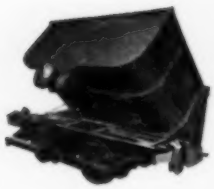


for safety and speed
of coupling
in all types of mine cars
and locomotives

WILLISON
automatic
COUPLERS

Over 100,000 Willison Automatic Couplers have been installed in cars and locomotives engaged in mining operations, industrial plant hauling and foreign railway service. And the number is continuing to grow every day.

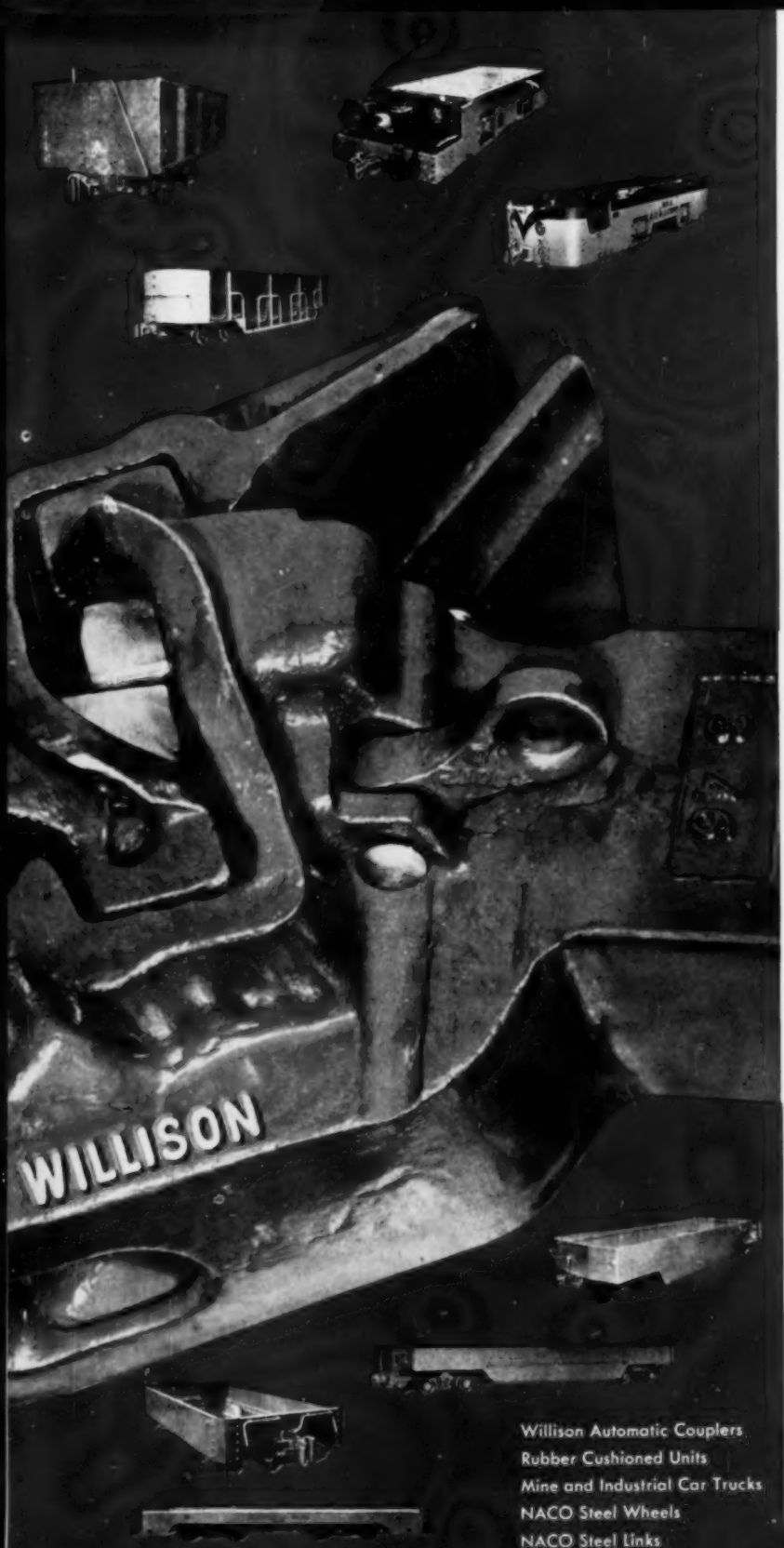
That's because operators know that with Willison Automatic Couplers you get three inherent advantages:

Safety — Since Willisons couple automatically and require no manual assistance, there is no need for men to go between cars.

Speed — Automatic operation and self-aligning feature speed coupling operations.

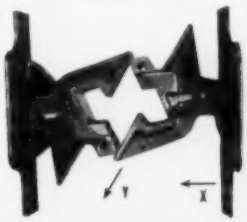
Strength — Willison Coupler heads take the full buff and pull forces. Strength does not depend on intermediate parts such as knuckles, pins and latching devices that are subject to failure.

If your operation involves haulage with cars of virtually any type in the 1 to 30-ton range, investigate the "3S" advantages—Safety . . . Speed . . . Strength—of Willison Automatic Couplers.



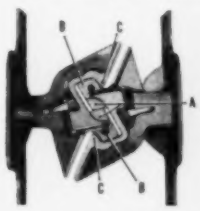
How the WILLISON COUPLER Works

1. Wide gathering range of the Willison allows automatic coupling even under extreme curve conditions. Simple four-part construction cuts maintenance and parts problems.



2. Pressure of one coupler against the opposite coupler forces the two into correct coupling position as train movement (X) aligns couplers (Y).

3. Locks (A), pushing against each other, retract into coupler head and permit lugs (B) to slide along coupler face into interlocking jaws (C).



4. Locks (A), having cleared each other, return to locked position without pre-setting or manual assistance; lugs (B) are now held interlocked with jaws (C).

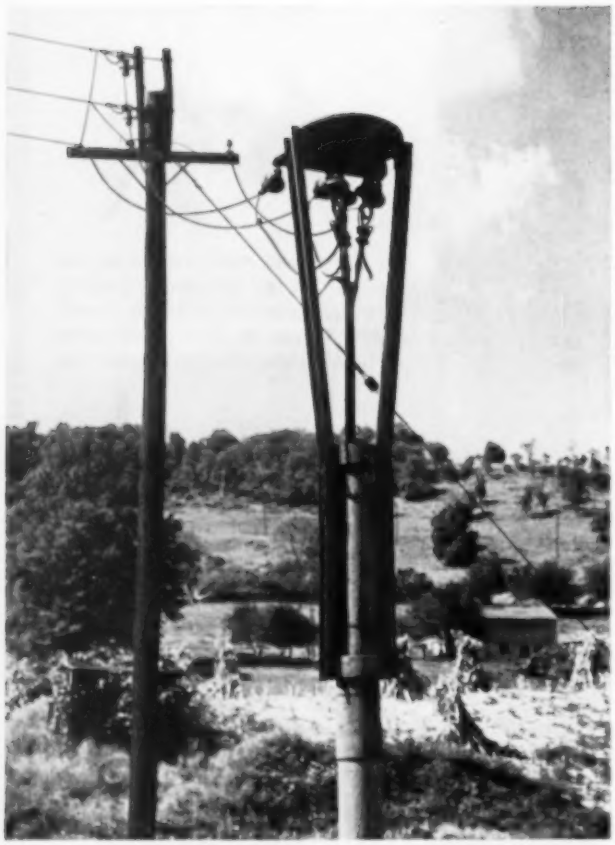
Willison Automatic Couplers
Rubber Cushioned Units
Mine and Industrial Car Trucks
NACO Steel Wheels
NACO Steel Links
and Swivel Hitchings

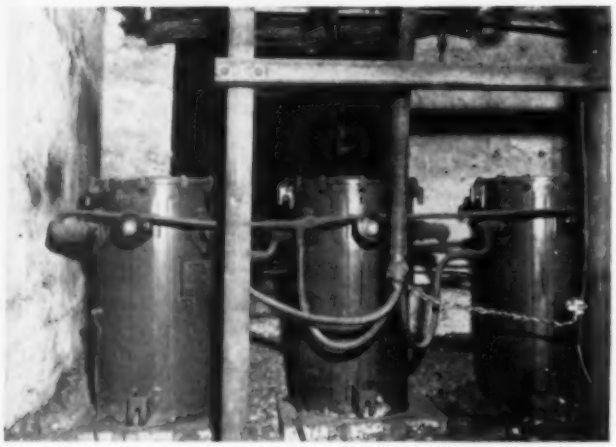
NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY

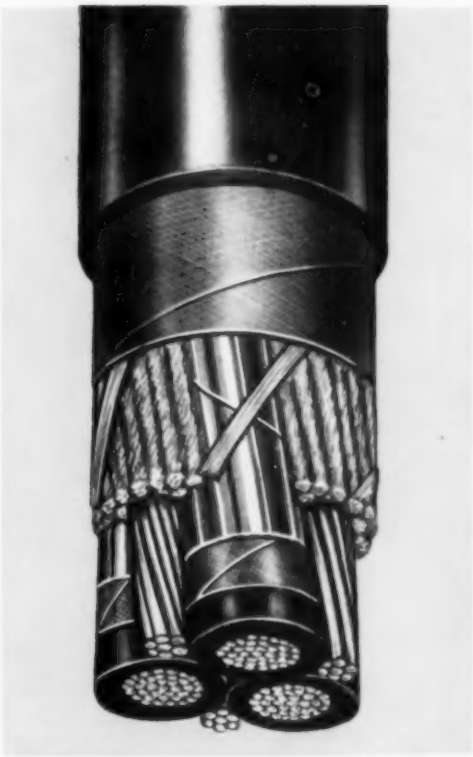
CLEVELAND 6, OHIO

Circular 5154, Willison Automatic Couplers and Multi-Pad Cushioning Devices, available on request.

AA-1755



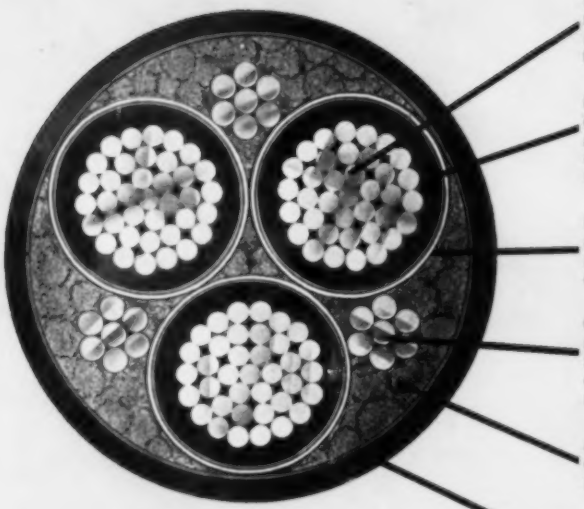




How this easier-handling

For your other mining cable requirements the Rome 60 line includes:

- **Parallel Duplex Shuttle Car Cables Types W and G**
- **Multiple-Conductor Portable Power Cables Types W and G**
- **Type SO Portable Cords**
- **Single-Conductor Locomotive Cables**
- **Multiple-Conductor Combination Power and Control Portable Cables for Specific Applications**
- **Shovel and Dredge Cables**



Power Conductor—ASTM Class B stranded, annealed bare copper, shielded with a semi-conducting tape.

Insulation—RoLene (polyethylene), complies with IPCEA and ASTM standards—suitable for maximum continuous conductor temperature of 75°C.

Electrostatic Shielding—Bare copper shielding tape over semi-conducting bedding tapes on each insulated conductor.

Grounding Conductors—ASTM Class B stranded bare copper—one grounding conductor in each interstice *in direct contact* with electrostatic shielding.

Assembly—Three shielded power conductors cabled with fillers and grounding conductors.

Sheath—Rome RoSeal, special black flame-resistant polyethylene, over the cabled and taped assembly—excellent mechanical and electrical properties.

mine power feeder cable **saves you money**

You can use it in boreholes, shafts, trays, aerially, or direct in earth...0 to 5000 volts...it's Rome·MPT!

Here's a *new* mine power feeder cable that trims costs 4 ways because of reduced weight, smaller diameters, lower initial cost and long service life. Rome·MPT is *safe*—safe as any conventional rubber and Neoprene constructions of equivalent capacity.

Reduced weight • Lighter weight (plus smaller diameters) shaves handling costs. And, where cable is end-suspended in a borehole (or aerially suspended), there is less strain on supporting members, because over-all weight is down as much as ⅓. For end-suspended borehole applications, where the conductors are the supporting members, this cable's reduced weight provides up to 33% longer suspensions.

Smaller diameters • Reduced diameters simplify installation . . . mean smaller fittings. Relocating installations is simpler, too.

Lower initial cost • First cost is less—as much as 28% in the case of 2 AWG 3-conductor rubber and Neoprene sheathed cable —5 kv.

Long service life • Perhaps your most important saving comes from the extra service life built into Rome·MPT. Rome·MPT combines RoLene (polyethylene) insulation with our special flame-resistant polyethylene sheath—Rome RoSeal. You get a cable highly resistant to most chemicals, to moisture, abrasion, and mechanical damage.

Important safety features of Rome·MPT are: Individual copper shielding of power conductors for ground fault protection—bare ground wires in direct contact with conductor shielding to provide a low-resistance circuit in the event of shielding failure or ground faulting of equipment—flame-resistant polyethylene—Rome RoSeal—sheath to minimize fire danger.

Rome Type MPT Power Feeder Cable comes in sizes 6 AWG to 250,000 CM, 3-conductor, rated up to 5000 volts. Write for full particulars or contact the Rome representative near you.

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ROME CABLE Corporation
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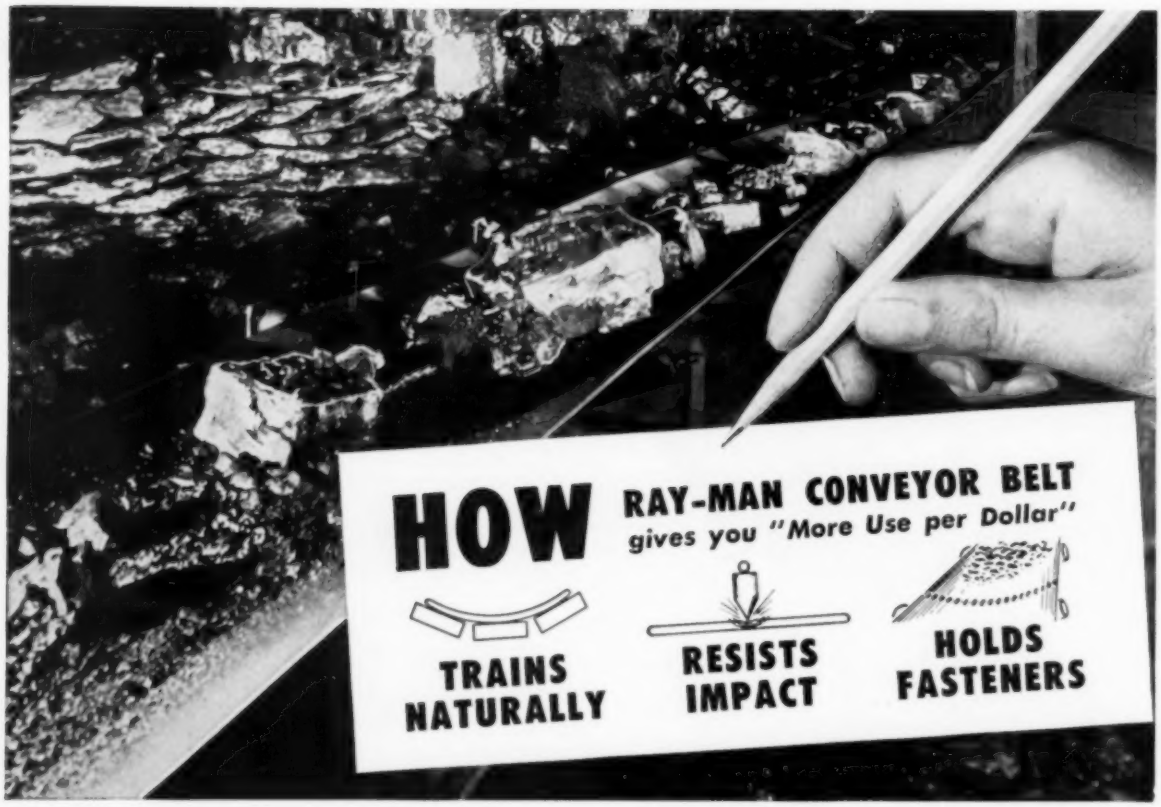

Many Users Say This Belt Outlasts Them ALL In Coal Mining

The Ray-Man Conveyor Belt features a new and different construction of covers and strength member to resist cuts, tears and abrasion to a degree never before attained. R/M's exclusive "XDC" Cover provides a degree of protection and long life not possible with any other belt. Inside this cover, Ray-Man Conveyor Belt combines elastic cushioned strength member plies in an envelope of strong, yet flexible synthetic fabric to resist gouging and tearing ... to take the impact of large, abrasive lumps... to permit the belt to trough easily and train naturally.

Like all Manhattan heavy duty conveyor belts, Ray-Man is moisture resistant and mildew-proof. It requires no breaker strip and holds fasteners considerably better than other types of belts. Let an R/M representative show you the advantages of Ray-Man as well as other R/M conveyor belts, including Homocord, with its extra cushion for unusually abusive shock loading. He'll help you select the belt best suited for your job . . . one designed to give you "More Use per Dollar." Write for Bulletins 6906 and 6915.

RM-600C

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RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

TOPS IN TEAM WORK—ALL THREE

each does a special job

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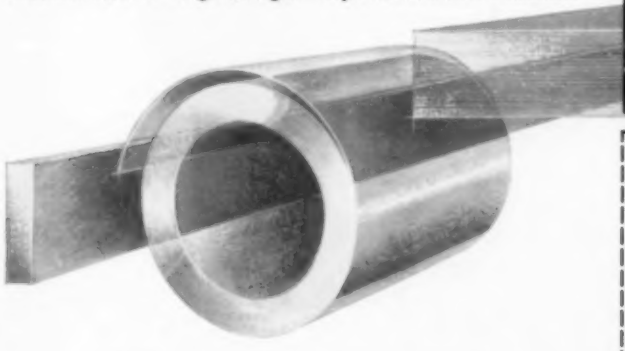

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Laying the "groundwork" for profitable blasting

He's laying the main (trunk) line of Primacord to connect all holes in a hook-up which will permit relief of burden — develop better fragmentation with less secondary blasting. Holes have been loaded and tamped. A "down" line of Primacord extends from top to bottom of each hole, in contact with all explosives in the load, detonating directly or initiating a primer — depending upon the type of explosive used.

When the trunk line has been laid, he'll cut it from the spool — then connect each "down" line at right angles to the trunk line with the simple half-hitch which has been found most effective for the type of Primacord used in the holes.

When all is ready for the blast, he'll prepare his fuse and cap (or use an electric blasting cap) and tape this cap onto the firing end of his Primacord hook-up.

Primacord is an insensitive detonating fuse. It cannot be set off by fire, friction or ordinary shock, but must be detonated. It is not affected by stray currents, and even a direct hit by lightning failed to detonate it.

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Primacord • Quarrycord • Ignitacord® • Safety Fuse
Blasting Accessories • Established 1836

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The Proved and Approved DETONATING FUSE

P-1

Devoted to the Operating, Technical and Business Problems
of the Coal-Mining Industry

Coal Age

JANUARY, 1956

IVAN A. GIVEN, EDITOR

In Every Way

THERE HAS NEVER BEEN A TIME in coal-mining history when men have been as important as they are today. This is true in spite of the money being spent to reduce the manpower required to mine, process and ship a ton of coal. In fact, it is true because of these expenditures, which put a constantly growing premium on skill and judgment all along the line, and especially on the skill and judgment of those directly in charge of the operation of these new and more-costly facilities. As investment continues to grow, bringing not only the rewards of higher productivity but also the possibility of greater losses following failure to make the most of the potentialities of the equipment and facilities, skill and judgment will be more vital than ever.

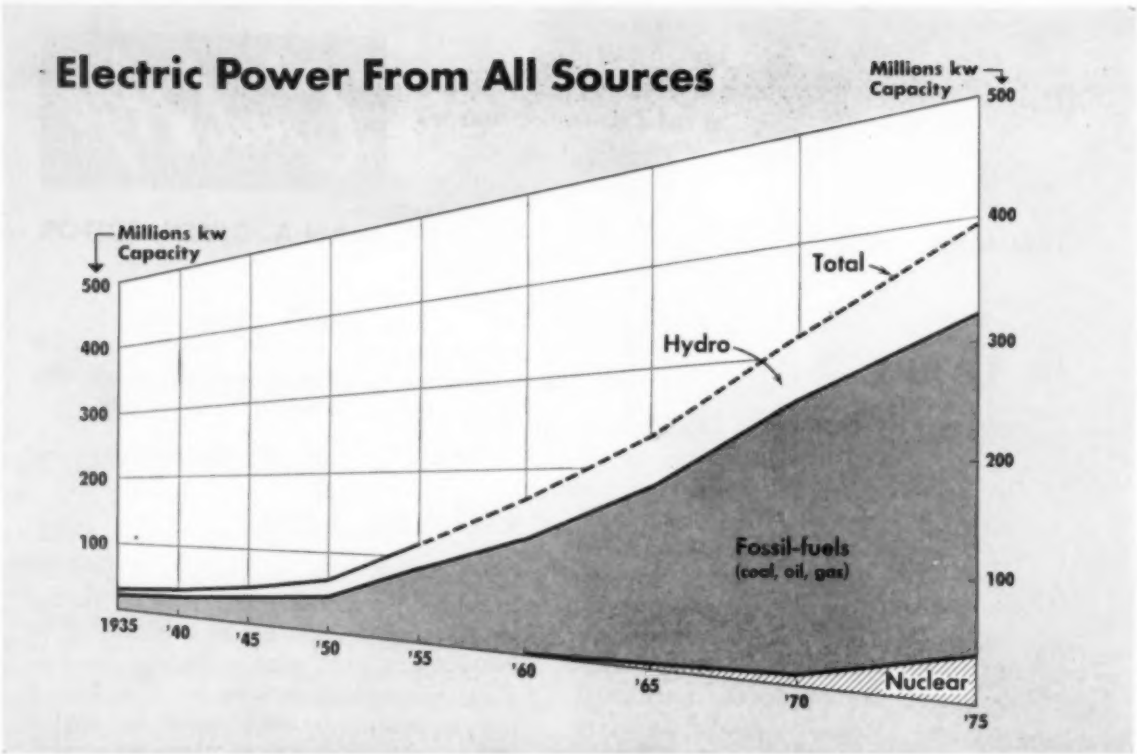
Because of this situation, developments in manpower supply and quality, particularly in the supervisory, managerial and engineering ranks, loom larger on both the debit and credit sides. Lafayette College's recent decision to accept no new additional mining engineering students because of low enrollment, as an example, can only be listed—regretfully—on the debit side. A significant share of the responsibility for this development, and for sparse enrollments at other mining schools must be accepted by the coal industry, which has not yet manifested an overpowering eagerness for new engineering talent.

On the credit side is a rebirth of interest in managerial development, from which one can hopefully conclude that there will be an equal growth in interest in the development of engineering talent. Neither is more nor less important than the other, though it might be said that face supervision is perhaps more critical than any other managerial skill and therefore should be one of the first to receive additional attention. More emphasis on management development means a better industry future. It is a program that coal men can join in with confidence that it will pay off in every way.

Others Too

COAL NOW is in the business of frontier-crossing—the necessary first step in the exploration and development of new lands or, in this instance, new markets. Perhaps the language is a little high-flown but it remains a fact that coal has definitely become the supplier of power for aluminum pot lines, thereby entering into a big new market. At the same time, competition from oil and natural gas has or is peaking, while its only possible new competitor —nuclear energy—is a decade or more off. Even then, as W. A. Raleigh's careful and penetrating study (see next page) of the present status and future course of nuclear power indicates, coal has a better-than-fair chance of maintaining a competitive advantage.

In the reduction of aluminum, Alcoa, with its Texas plant, was the first to turn from hydro, oil and natural gas to coal for energy. Now Kaiser makes the break definite with the announcement of a 220,000-ton plant at Ravenswood, W. Va., with coal as the source of power. One conclusion is that if aluminum's expected expansion takes place, the majority of it will be on coal power, opening up a new market that could total 20,000,000 tons a year by 1965. In any event, several more million tons are in the cards for coal. The coal-burning utilities, including Texas Power & Light and the American Gas & Electric Co., deserve a big hand for the work they have done in capitalizing on the low cost of coal today and in the future. And if one frontier can be crossed by coal, so can others. The keys are cost, quality and service, liberally supplemented by research and development.



Expanding economy means . . .

The Nation will need 395 million kw of generating capacity by 1975. Hydro plants will supply 70 million kw; nuclear plants, perhaps 40 million kw. This leaves big gap of 285 million kw to be filled by fossil-fuel plants. . . . . RESULT ➡

Can The Atom Compete . . .

NEWEST coal-burning power plants consume ¾ lb of coal per kwhr, compared to 3 lb per kwhr in 1920.

By W. A. RALEIGH JR
Assistant Editor, COAL AGE

WHEN AND HOW FAR will atomic power enter the commercial picture? How will it affect coal? Cutting through the "atomic stardust" the realistic answers to these questions are:

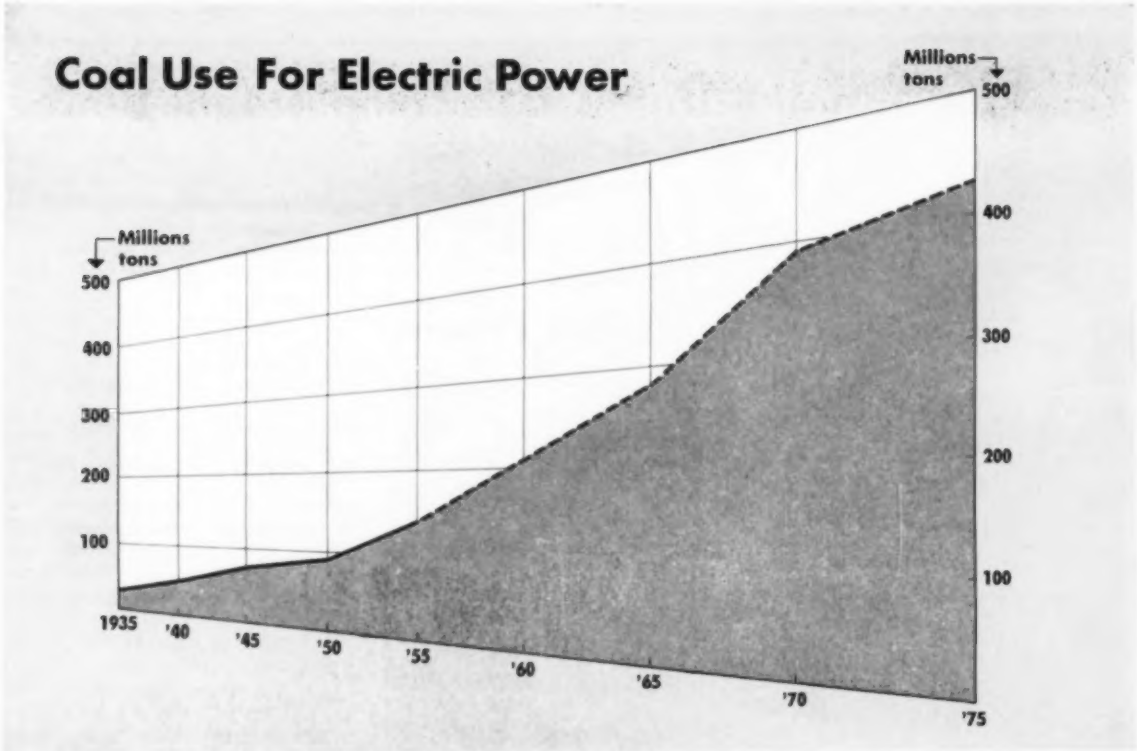
1. If the country's electric power needs are to be met in 1975, annual coal use for power by that time must climb to 430 million tons, or more than three times current usage.

2. The amount of nuclear power likely to enter the commercial market during the next decade is virtually negligible. But present development programs, if and when they solve the knotty problems involved, could provide the springboard to greater quantities of nuclear power later.

3. No true picture of nuclear power costs exists now. Even when such becomes available, perhaps 10 to 15 yr hence, the prospect is slim that nuclear power will be cheaper than fossil-fuel power. The best bets for use will be in high-cost fuel or power-short areas.

4. Utilities have joined the reactor development program to insure ample supplies of fuel to meet the country's long-range power needs. They cannot afford to pass up a stake in a supplementary heat source, particularly when talk persists about possible depletion of oil and gas reserves.

5. The critical period for evaluation of nuclear power should come



Sharp rise in the use of coal . . .

By 1975, coal use for power will increase to 430 million tons—more than three times 1955 use for the purpose. This estimate assumes that coal will hold at least its present 65% share of the fossil-fuel power market.

In Making Tomorrow's Power?

during 1965 to 1970. And what the coal and other fossil-fuel industries do between now and then to fortify their competitive positions will be the biggest factor in determining if and how far nuclear power spreads after 1970. In improving its competitive position, coal, as compared to oil and natural gas, has unique advantages in its huge backlog of reserves and in its big potential for reducing mining and delivery costs.

6. Atomic energy may never be competitive with coal and other fossil fuels. An increasing number of analysts see the country's energy demands rising to such magnitude that there will be (a) more energy tasks than fuel supplies, and (b) greater use-specialization and mutual dependence among fuels.

POWER NEEDS BY 1975: 430 Million Tons of Coal

The sharp upward trend in energy demands dominates the outlook on what fuels will be used for power in the future *Electrical World*, a McGraw-Hill publication, sees the Nation needing a total generating capacity of 320 million kw by 1970—more than 2½ times the 1955 capacity. At this rate of growth, generating capacity by 1975 should hit 395 million kw. Of this amount, hydro plants will supply about 70 million kw, and nuclear plants perhaps 40 million kw. This leaves a big gap of 285 million kw to be filled by coal, oil and gas-fired plants.

The above estimates tie in closely with economists' predictions about a long-range expansion in the economy. And these conclusions are suggested:

1. There will be room for some time to come for all suppliers of heat sources in the U. S. market.

2. Government-backed atomic power can do little more than help meet the national power demand.

Putting the conclusions in coal language, the production of electricity from the atom may grow to 40 million kw (a General Electric estimate), or 120 million tons of coal equivalent by 1975. By that time, coal use for power must climb to 430 million tons, or more than three times current usage, if the country's total projected power needs are to be met.

NUCLEAR PROBLEMS: Huge, Obscured by Optimism

Commercial atomic power is still in its infancy. Much research and development work is needed to solve such problems as reprocessing of nuclear fuels, waste disposal and safety. These

What the Nation Is Doing to Develop Atomic Power

Developer	Est. Operation Date	Power Megowatts Heat	Elec.	Reactor Type	Est. Cost Millions Dollars	Owner	Probable Designer or Builder	Location
Power Units Planned								
AEC	1957	264	60	Pressurized water	85	AEC	Westinghouse	Shippingport, Pa.
AEC	1959	62.5	15	Fast breeder	40	AEC	Argonne Nat'l. Lab.	NRTS, Idaho
AEC	1956	10	2	Homogeneous	3	AEC	Oak Ridge Nat'l. Lab.	Oak Ridge, Tenn.
AEC	1959	65	16	Homog. thorium	44	AEC	ORNL	Oak Ridge
AEC	1956	20	0	Sodium graphite	10	AEC	North American	Santa Susana, Calif.
AEC	1956	20	5	Boiling water	17	AEC	ANL	Lemont, Calif.
Army Package	1958	10	1.7	Press. water	2.2	AEC	American Loco.	Ft. Belvoir, Va.
Consolidated Ed. Co.	1959	500	140	Press. water	55	Con Ed	Babcock & Wilcox	Peekskill, N. Y.
Power Units Proposed								
Nuclear Pow. Group	1960	670	180	Boiling water	45	NPG	G. E. & Bechtel	Near Chicago, Ill.
Atomic Pow. Dev. Assoc.	1958	300	100	Fast breeder	54	APDA	APDA	Michigan
Yankee Atomic Elec. Co.	1957		134	Press. water	20-25	YAE		Rowe, Mass.
Consumers Pub. Pow. Dist. of Columbus	1959		75	Sodium graphite		CPPDC	North American	Nebraska
Pennsylvania P.&L. Co.	1962		150	Homog.		PPL	Westinghouse	Eastern Pa.
Research Facilities								
Westinghouse	1957	10	0	Modified Materials Test	6.5		Westinghouse	Blairsville, Pa.
Gamma Corp.	1956	0.5-1	0	Mod. H_2O boiler	0.75	Gamma	To be on bids	Mansfield, Mass.
Amer. Mach. & Fdy. Group	1956	1	0	Swimming pool	1-1.5	AMF Group	AMF	New York, N. Y. area
Armour Res. Foundation	1956	0.05	0	Water boiler	0.5	ARF	North American	Chicago, Ill.
Pennsylvania State U.	1955	0.1	0	Swimming pool	0.3	PSU	PSU	State College, Pa.
Univ. of Michigan	1956	1	0	Swimming pool	1	U. of M.	Babcock & Wilcox	Ann Arbor, Michigan
Mass. Inst. of Tech.	1957		0	Closed tank, D_2O	1-1.5	MIT	To be on bids, 1/56	Cambridge, Mass.
Livermore Laboratory	1957	1	0	Swimming pool		AEC	Foster-Wheeler	Livermore, Calif.
Omega West	——	1-4	0	Swimming pool		AEC	Los Alamos Sc. Lab.	Los Alamos, New Mexico
Brookhaven Medical	——	1	0	Mod. CP-5		AEC	To be on bids	Upton, N. Y.
Oak Ridge Research	1957	5-10	0	Mod. swim. pool	2.8	AEC	ORNL	Oak Ridge
Engineering Test (AEC)	1957	175	0	Mod. MT	15		Kaiser Engineers & G. E.	NRTS, Idaho
Battelle Institute	1956	1	0	Swimming pool	1.5	Battelle	Amer. Mach. & Foundry	Columbus, O.
Watertown Arsenal	——		0	Swimming pool			Bendix Aviation	Watertown, Mass.
Naval Res. Lab.	1956	0.1	0	Swimming pool	0.3		To be on bids	Wash., D. C.

Data from *Nucleonics*, a McGraw-Hill publication. Cost figures are not directly comparable.

Nuclear Power Group includes American Gas & Elec. Serv. Corp., Bechtel Corp., Commonwealth Edison Co., Central Illinois Light Co., Pacific Gas & Elec. Co., Union Elec. Co., Illinois Power Co., and Kansas City Power & Light Co.

Atomic Power Development Associates includes Central Hudson Gas & Elec. Co., Cincinnati Gas & Elec. Co., Consumers Power Co., Delaware Power & Light Co., Detroit Edison Co., Long Island Lighting Co., Philadelphia Elec. Co., Rochester Gas & Elec. Co., Toledo Edison Co. and others to join later.

Yankee Atomic Electric Co. includes New England Power Co., Connecticut Light & Power Co., Boston Edison Co., Central Maine Power Co., Hartford Elec. Light Co., Connecticut Power Co., Western Massachusetts Elec. Co., Public Serv. Co. of New Hampshire, Montaup Elec. Co., New Bedford Gas & Edison Light Co., Cambridge Elec. Light Co., and Central Vermont Public Service Corp.

problems are not insurmountable but they are gargantuan. In "Energy Sources – Wealth of the World," Eugene Ayres and Charles Scarlott put it this way: "The production of energy from nuclear processes is hedged by problems that in size, number and complexity make every engineering project heretofore attempted seem like a Tinker Toy operation. The problems that surrounded the development of television are child's play by comparison."

Even the Atomic Energy Commission has become concerned about toning down the imminence of nuclear power. W. Kenneth Davis, AEC's reactor development head, believes that a wave of optimism has obscured the facts on the status of reactor technology and the nature of the obstacles that must be overcome. "We have never built nor operated a nuclear power plant of even modest size. We do not really know what the construction and operating problems and costs are. It will be 2 yr or more before the first large-scale nuclear power plant commences operation. It will be some years after that before any real amount of operating experience is accumulated."

Mr. Davis points to many vexing technical questions still to be answered, such as, "how to fabricate fuel elements which will withstand the desired neutron fluxes for the necessary length of time. We do not know what materials to use in constructing reactors which will resist corrosion and radiation damage and which will have the necessary strength for years of operation. We do not know how to chemically process irradiated fuel elements cheaply and how to fabricate the fissionable materials produced into new elements."

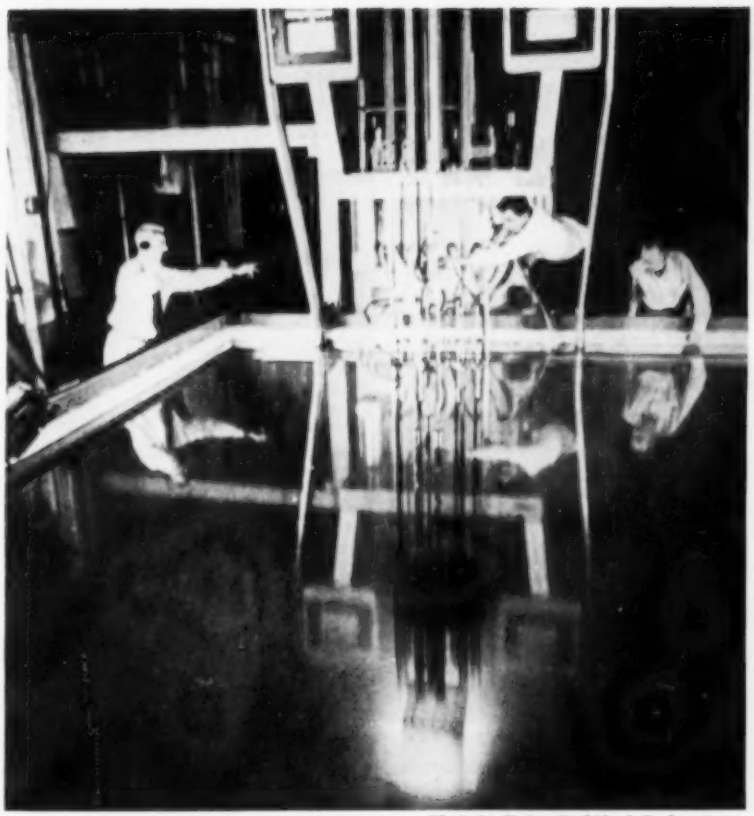


Photo by Union Carbide & Carbon Corp.

WATER in swimming pool reactor acts as a moderator and as a shield from radiation. Reactor's flexibility and ease of handling make it a key tool in solving tough nuclear problems.

LOOKING FAR AHEAD:
Don't Underestimate the Atom

In spite of its present infant status, the long-range possibilities of nuclear power should not be underestimated. Both the U. S. government and industry have started ambitious programs to prove that power from the atom can be made practical and economical. Two important milestones in the shift from laboratory to practical application were achieved in 1955:

1. The Argonne National Laboratory supplied power from a boiling-water reactor experiment to the town of Arco, Idaho. This was the first time that a community in the Nation received its entire supply of power from a nuclear source.

2. A liquid metal-cooled reactor fed power into the system of the Niagara Mohawk Power Corp. at West Milton, N. Y. This marked the first commercial distribution of power generated from nuclear fuel.

These successes are only small parts of the country's total effort, most of which is given in the reactor program roundup (p 56). The government's program includes the construction of seven experimental power reactors to study different technical approaches to practical nuclear power. Chiefly, these are small plants with a total capacity of about 100,000 kw. Their cost will be about $200 million, financed mostly by Atomic Energy Commission funds. Scheduled completion dates for the plants run from 1956 to 1958.

Following closely on the heels of the government program, industry has announced proposals or plans to build six large nuclear power plants. Ranging in capacity from 75,000 kw to 250,000 kw, they will have a total capacity of 780,000 kw. Four of the plants will be built partly, and the other two entirely, with private funds. These plants will use technology being developed in the government experimental power reactor program. Their scheduled dates of completion range from 1957 to 1960.

Industry will no doubt also be announcing plans for small-scale nuclear power plants in 1956. *Nucleonics*, a McGraw-Hill publication, reported in October, 1955, that the AEC has invited proposals for installations ranging in electrical capacity from 5,000 kw to 40,000 kw. The object is twofold: (1) to quiet criticism from public-power groups that previous invitations were tailored for large electric utilities, and (2) to encourage export of reactors by developing the lower-power types suitable for overseas areas.

Many private, industrial and university research groups are also contributing to the civilian power-reactor development program. They have already set up or are planning facilities to study improved reactor design, develop better reactor construction materials, and solve other pressing problems associated with reactor development. Most of the research re-

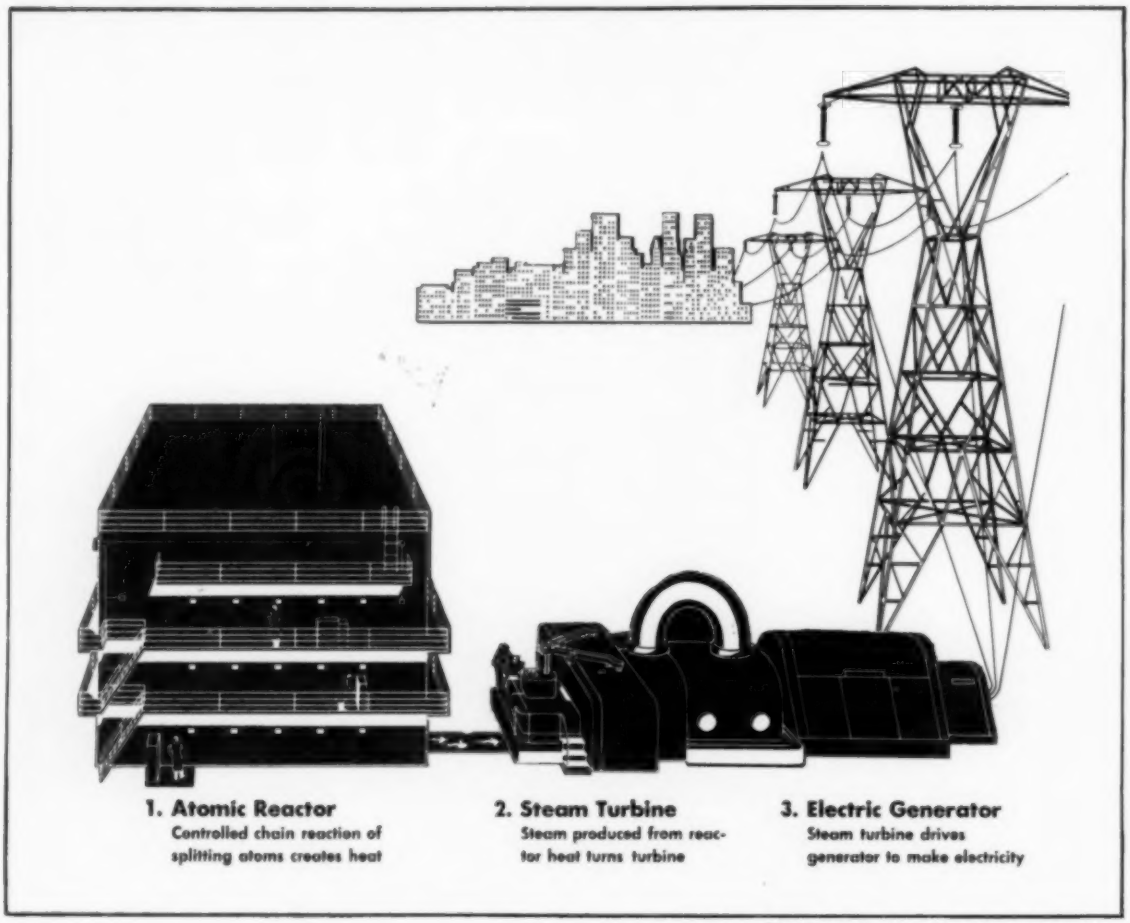

1. Atomic Reactor
Controlled chain reaction of splitting atoms creates heat
2. Steam Turbine
Steam produced from reactor heat turns turbine
3. Electric Generator
Steam turbine drives generator to make electricity

Illustration by Union Carbide & Carbon Corp.

How the atom produces power. Question for the future . . .

actors are listed in the reactor program roundup (p 56).

What do the present reactor development programs mean? In terms of generating capacity, the total nuclear power that will be made available by 1960 is insignificant. Estimates place this total at less than 1 million kw, or not more than 1% of the country's present capacity.

What is important, however, is that the present programs will provide the springboard to future progress. The completion of the first generation of nuclear power plants will set up the "testing grounds" for obtaining vital operating experience data. From the accumulation and study of such data between 1960 and 1965, chances are that nuclear engineers will be able to decide which of the five types of nuclear power reactors will be best for planning a "second generation of plants. When these are in operation, a sounder appraisal of nuclear power costs could be achieved.

UTILITIES VIEWPOINT: An "Insurance Policy"

Participation in nuclear power development has this added meaning to the utility industry: it provides an "insurance policy" against the future growth in the country's long-range power needs. Utilities cannot afford to pass up the prospect of a new source of fuel which could supplement those now in use. The extent of the utility industry's interest is indicated by the fact that about 45 organizations are represented in nuclear power study groups. These supply about 50% of the Nation's total generating capacity.

While joining in the civilian reactor program, utilities are still pushing investment in steam generating stations. New facilities under contract now should bring a 37% increase in coal use during the 1955 to 1960 period.

Between 1955 and 1970, *Electrical World* forecasts that the utility industry will up its annual spending on generating equipment from $1,727 million to $3,164 million. Even as late as 1970, most of this investment will be in fossil-fuel burning equipment.

Also significant, utilities show no let-up in efforts to improve the burning efficiencies of conventional fuels. In 1954, for the first time, the use of coal for steam generation fell to an average of 1 lb per kwhr, a drop from 1.06 per kwhr in 1953 and from 3 lb per kwhr in 1920. By 1970, the national average could hit ¾ lb per kwhr—a rate which some of the newest stations have already achieved.

NUCLEAR POWER COSTS: No True Picture Now

An estimate of the Atomic Industrial Forum shows that a generating cost of 10 to 15 mills per kwhr should be achieved by large nuclear plants planned for the near future. Such predictions are said to include huge

COAL'S ANSWER TO THE ATOM—Modern machines to keep cost competitive.

Can it compete with low-cost coal?

research and development costs. As these are reduced and as nuclear power becomes a quantity operation, it is claimed that subsequent plants will drop to and below 7 mills per kwhr. Later plants would thus become competitive with large fossil-fueled plants where the present generating cost ranges from 3 or 4 to 7 mills per kwhr.

There is, however, this cold, inescapable fact: No true picture of nuclear power costs exists now. The best estimates today are based on assumed costs. These are calculated by projecting data obtained from the operation of small-scale, prototype or military reactors. And the margin for error in such projections is generally admitted to be great. As explained by R. D. Maxson, senior vice president, Commonwealth Edison Co., and chairman, Operating Committee, Nuclear Power Group, Inc.:

"In conventional design we seldom apply the data of a basic plant to a facility more than twice the size of the original design. In the nuclear field, because of the desire to explore larger capacities and enhance development knowledge, basic data have been extended 20 times or more and can only be confirmed by the construction of a large plant."

Another obstacle to true evaluation of nuclear power potentials is the lack of data on fuel element costs. Although the AEC is releasing an increasing amount of data to industry, exact cost figures are still classified. Fuel element costs are a critical factor because uranium, in its native state, is not ready for use in a reactor. Unlike coal, uranium must be fabricated into fuel elements. And there is little doubt that fabricating costs exceed those of the material itself.

Not to be overlooked, however, is this fact. Uranium is a "freightless fuel." Its fabrication costs could be offset, partially or completely, by the delivery costs for coal. "A typical large-scale nuclear plant will require less than 50 tons per year of new fuel while the comparable conventional plant needs about 475,000 tons of coal," Mr. Maxson states. "The coal plant might produce as much as 50,000 tons of ash annually while even the requirement of heavy shielding for the nuclear plant's discharged fuel elements will result in transporting less than 1% of this weight."

Dr. R. N. Hafstad sees a big problem in developing a volume market for nuclear power. "Unless we can get a volume business of some kind, a real market for reactors, it will not be possible for the suppliers to get up production tooling and get costs down." The General Motors research head and former AEC reactor development chief suggests that developing a foreign market for reactors may be a good temporary solution to this problem in view of the limited foreseeable market in the United States.

Even if present cost problems are eventually solved, the possibility of cheaper electric power from the atom is remote. Here's why. The cost of conventional fuel takes only 17c or a minor portion of the consumer's electric dollar. And it is highly unlikely that nuclear power could reduce plant and transmission expense, the two major items in total power costs.

THE ULTIMATE OUTCOME: More Energy Tasks Than Fuels?

Many authorities doubt that atomic energy will ever be competitive with coal or other fossil fuels. They foresee the country's energy demands rising to such magnitude that every fuel resource, atomic or conventional, will have more than its share of the load to carry. The basic job will be maximum conservation of total energy resources. This means assigning each fuel to the job it can do most efficiently, so that enough fuels will be available to do all energy tasks.

To a great extent, conventional fuels have been assigned to do the electric power job each can do most efficiently. Coal power dominates the heavily industrialized East where it has natural cost and supply advantages. For the same reason, natural gas markets are centered in South Central and Western areas. Oil does best in Pacific and New England states. Throughout the country, however, there are still wide discrepancies in fuel costs. The average cost of fuel per net kwhr may range, for example, from 1.2 mills in Texas to 2.1 mills in Kentucky, 4 mills in New York, 5.2 mills in Maine, and 6.8 mills in Oregon.

AEC on Subsidy Policy

"The commission is specifically enjoined from setting itself up in the nuclear power business. It is forbidden to produce and sell nuclear power, except when such power is a surplus by-product, incidental to the operation of a reactor for research and development purposes or for the production of fissionable materials.

"Nor may the commission subsidize the building of nuclear power plants by private industries or publicly-owned utilities, except to the extent that it may provide assistance in research work which will expand the fund of theoretical and practical knowledge and advance the nuclear art for the good of all.

"It has neither the desire nor the intention to compete with private industry in the building of reactors, furnishing equipment, facilities or materials, or rendering technical services. It proposes to stay out of such business whenever there is a commercial supplier available.—*Lewis L. Strauss, chairman, Atomic Energy Commission, before Case Institute of Technology, Cleveland, Ohio, Nov. 9, 1955.*

Atomic energy might therefore perform this useful task. It could supplement the work of conventional fuels by supplying power to present high-cost fuel areas. With relatively minor transportation costs for nuclear fuel, the net result could be more uniform power costs across the nation. At the same time, supplies of conventional fuels now used in high-cost areas would be released for other tasks.

When viewed from the national interest, atomic energy and coal are already partners. Major atomic energy plants are expected to use 61 billion kwhr of electric power in 1956, 80% of which will be generated by coal. This will require about 30 million tons of coal, or 6% of total estimated 1956 coal production.

Other indications of future mutual dependence have appeared on the scene. For example, the USBM is reportedly experimenting with a nuclear reactor for synthesizing natural gas from coal or oil. By eliminating the oxygen plant which consumes 70% of the energy required in the present method, the new process is said to result in a gas having a heat content nearly equal to the input of coal.

In the conservation of total energy resources this prospect should also be kept in view. The day may come when the country's huge coal reserves may have to do jobs which other hydrocarbon fuels are now doing and which atomic energy probably will never be able to do. Some scientists predict a serious depletion of petroleum and natural gas resources in another 25 yr. When and if this occurs, coal could become the major source for liquid fuels vital to motor transport. It might have to supply the fast-growing segment of the chemical industry now based on petroleum. It might also have to replace petroleum and natural gas markets in space heating.

COAL'S JOB: Plan Now For Nuclear Progress

Lack of proof that nuclear electric power can be made practical or economical is no cause for coal to "rest on its oars." At one time, television, jet aircraft, the transistor, nylon and numerous other items were strictly for the dreamers. Today, within a relatively short period of time, these dreams have mushroomed into commercial realities. Modern research and technology give no ground to the notion that its problems are insurmountable. Coal must therefore adopt an industry-action program geared realistically to the prospect that great progress in nuclear power development will be made during the next quarter-century.

If coal anticipates such progress now, the industry will have a 10- to 15-yr jump during the critical 1965 to 1970 period when engineers probably will (1) put the "second generation" of nuclear power plants on the line, and (2) be able to come up with a sounder appraisal of nuclear power costs.

Coal Age (November, 1955, p 54) proposed a general program for the industry's action in meeting the competition ahead. This program, as applicable to potential competition from nuclear fuel as to actual competition from natural gas and oil, stressed the need for:

1. Making sure that production capacity is adequate to satisfy future demands.
2. Maintaining or reducing production costs through increased operating efficiency and mechanization.
3. Improving merchandising methods for more effective selling of consumers on the merits of coal and coal-burning equipment.
4. Checking constantly on existing, new or growing markets for opportunities to increase sales.
5. Providing reasonable wages to labor.
6. Reducing mine-to-market costs.
7. Campaigning for fair treatment in state and national legislation.
8. Expanding research to develop new or improved techniques on how to use, market and produce coal.
9. Conducting an industry-wide public relations program.

Where atomic energy, the "dark-horse" potential competitor is involved, there is added need for thought and action on these points:

1. New methods or substitutes for transporting coal must be developed, such as, overland pipe lines, gasification, and the location of industrial plants near mine sites. Atomic energy is virtually a "freightless fuel," thus giving nuclear power its greatest potential competitive advantage.
2. The use of automatic systems for cutting, conveying and loading coal must be spread across the industry. Along with a new approach to the transport of coal, more mechanization and higher output per man-day can contribute most to lowering the delivered price of coal. Today's mines average about 11 tons per man day. The industry average could be pushed upward as early as 1960 to 16 tons per day—a rate which many individual mines have already achieved or bettered.
3. More research must be focused on ways that coal and atomic energy can serve each other. Power from nuclear reactors, for example, may eventually be the answer to economical conversion of coal to gas and liquid fuels.
4. The development of nuclear electric power must be accepted in the national interest. The Nation needs a supplementary heat source because of the expected growth in energy demands, the possible depletion in natural gas and oil supplies, and the existence of high-cost fuel areas and power shortages at home and abroad.
5. Limited government subsidy, as defined in an AEC policy statement on this page, must be recognized as vital to the atomic energy industry. Such recognition has already been given by the National Coal Association (*Coal Age*, December, 1955, p 128).

The Coal Commentator

More and Better

A bituminous production rate of around 600,000,000 tons by 1960 or 1961 has a fine—and logical—sound in view of the mounting evidence that coal is headed for better things and will have less and less competition as the years go by. But as pointed out in *Coal Age* last month, if we have 600 million at that time, there will have to be a lot of new mines, since some 110 millions of new capacity and 135 millions of replacement will be required to reach and maintain a 600-million level of output.

What will these new mines be like, and where will they be? The process of bringing them into production has already begun. This is evidenced by the accelerated rate at which announcements are appearing. Also, it is evident that the majority of them will be opened east of the Mississippi River, with many of them on water. They will be in thinner seams for the most part, and as fast as the equipment becomes available even the thinner coal will be worked with continuous-type equipment. In fact, remotely controlled equipment undoubtedly will be accounting for a significant percentage of the output in the relatively near future, and will be paralleled on the surface by completely automatic plants. **The efficiency will be much greater, the price of coal no higher even if not lower, and the net per ton will be definitely better. All in all, the next 5 to 10 years should prove both interesting and profitable to coal men who are on the ball.**

Well Done

The roll of those within and without the industry who have given wholeheartedly to the cause of mine safety is a growing one but still is not so lengthy that the name of John J. Forbes does not stand out. His retirement from the U. S. Bureau of Mines Nov. 30 marks the end of an affiliation that began in 1915 and has been distinguished by a steadily increasing contribution to safety and health in a wide range of positions from first-aid miner to director.

There is no one who will dispute his devotion to his duty. There is no one who will not feel a sense of regret that he is not still in there pitching. And there is no one who will not join in a heartfelt "Well done!"

English Accent

Readers of Bill Raleigh's study of the future of nuclear power in the production of electricity, which precedes this page in this issue of *Coal Age*, may be interested in a couple of quotes from Great Britain:

"By 1965, Great Britain will be producing atomic power equal to 6,000,000 tons of coal, rising 10 years later to the equivalent of 40,000,000. But we shall still need all the coal we can get. Only when coal prices itself out of the market will atomic energy be a substitute for coal."—*J. Eccles, deputy chairman (operations), Central Electricity Authority.*

"Energy from coal is complementary to energy produced from atomic power, and the idea that atomic energy will oust coal as a source of energy is rubbish . . . Coal should not be wasted by being burnt in fires or used for generating electricity. It should be used for extracting valuable chemicals."—*Roger Sewill, director, Aims of Industry organization.*

The second of the two quotations introduces an idea that is being put forth with increasing frequency in coal-short countries. From the United States standpoint, the big drawback is that the higher uses, as yet, do not add up to much tonnage. This is not to say that the prospects aren't good for later. **For the present, however, with ample reserves and an efficient mining plant, U. S. coal men will continue to go after the heavy-fuel market where the volume is, meanwhile keeping an eye on the possibilities of the higher uses and others as well.**

16 Tons

Tennessee Ernie fans will recognize the head on this piece as the title of a hit song that is helping in the process of putting coal in the limelight these days in more ways than one. Parenthetically, when your commentator started out, we expected to do at least 6 tons better and scrap a bottom to boot. But maybe we had a little thicker coal and perhaps better conditions. Incidentally, we stood higher with the shovel and pick manufacturers because our consumption per shift naturally was greater.

Then we have Stanley Skeens, an electrician at the Wharton No. 2 mine of Eastern Gas & Fuel Associates, in southern West Virginia, who took the Bible as his subject and took home $32,000, minus taxes, for five quiz-answering sessions on television's "$64,000 Question." He proved his right to the prize and he won the hearts of millions of people in the process. And in that same process he undoubtedly left with those same millions of people a favorable opinion of the coal-mining industry that could have been gained in no other way. **Thus coal has been favored with a rare break. For it, and for those fine qualities of his own that he so ably demonstrated, a salute to Stanley Skeens, coal miner extraordinary.**

Blowing dry rock dust through a wetting nozzle permits on-shift rockdusting right up close to an operating continuous mining machine. Shuttle-car drags spread dry dust on floor.

BEFORE These two photos show conditions in a dead-end entry, 55 ft inby the last open crosscut, 10 sec (left photo) and 15 sec

Wet Rockdusting in Continuous

By WAYNE D. SNELL,
Assistant Director, Mine Inspection—
Coal Operating Div. United States
Steel Corp., Pittsburgh

AFTER Immediately after starting (left) and even 1 min after (right), the improvement in visibility resulting from wet application of

WITH THE INTRODUCTION of mining machines which advance into the coal more than 40 ft a shift, it became necessary to utilize all available time to mine and load the coal. A means had to be found by which rock dust could be applied other than by being blown dry on the coal surfaces thereby eliminating air-borne dust. If applied on shift, the dry rock dust affects the visibility of the men working on the return side of the air current.

An idea has been advanced to use a sand-cement nozzle to mix the dry dust and water in the nozzle and apply the dust on the ribs and roof in a slurry form.

In conjunction with the U. S. Bureau of Mines, Pennsylvania and Kentucky Departments of Mines, and the Mine Safety Appliances Co., who furnished the equipment, we have done experimental work under actual operating conditions over a 3-mo period at No. 32 mine, Lynch, Ky., and Leisenring No. 3 mine, Uniontown, Pa., both owned and operated by U. S. Steel Corp.

Adapted from a paper presented at National Safety Congress, Chicago, Ill., Oct. 18, 1955.

The equipment used to apply the wet rock dust is an off-track Bantam rock-dusting machine using a 20 ft section of 2-in rockdusting hose. A ⅝-in water hose is used with 200 lb pressure on the water line. The rock-dusting and water hoses are attached to rubber-lined nozzle which is 11 in long with a diameter of 1½ in at the discharge end. The water flow is controlled by a gate valve connected to the nozzle. As the air-borne dust passes through the nozzle, a series of eight orifices in a water ring introduces a fine spray of water into the air-dust stream. The operator controls the amount of water used so that all the dust is wetted and discharged in a controlled slurry, propelled by the air onto the surfaces to be covered. It was determined by test that the best mixture of wet dust was obtained when 6.5 gal of water were used with 100 lb of dry rock dust.

(right) after starting the rockdusting machine. Dry dust is suspended in the air, reducing visibility. The camera is outby the dusting operation.

Mining Cycle

rockdust is apparent. Here the camera is inby the point of wet application in a dead end 52 ft from last open crosscut.

EQUIPMENT includes rock-dust hose, water hose, nozzle and valve.

At Mine No. 32 at Lynch, in a drift opening, the High Splint seam of coal, which averages 6.4 ft in thickness, is mined from slate to slate. Entries and cross-cuts are on 75-ft centers and had been advanced a distance of 3,000 ft from the surface when the application of wet rock dust began. A single split passing 20,000 cfm ventilated the faces and crosscuts of eight entries. The belt entry is ventilated independently of the main split.

Conventional trackless equipment is used to mine and haul the coal to a conveyor belt that transports the coal to the surface. Water sprays are used to allay the coal dust on cutting and loading machines and at discharge points for shuttle cars and belts.

The cycle of work is to install roof bolts, cut, drill, shoot, load the coal and apply wet rock dust to the top and sides of the entries and crosscuts. Dry rock dust is applied to the floor. If wet rock dust is applied to the floor it creates a slimy undesirable condition. Bags of dry rock dust are spilled on the floor and the drag on the shuttle car does a very good job of distributing it over the floor surfaces.

The following is a summary of data on wet and dry rock dusting compiled for 10 shifts by the industrial engineers at Lynch:

(*Continued on next page*)

STILL WET, rock-dust slurry (left) provides complete cover. A month later rock-dust coating still is intact.

Staying power is characteristic of wet-applied rock dust on roof and ribs

	Rock Dust Applied Wet	Rock Dust Applied Dry
Average width of places	19.1 ft	19.5 ft
Average height of place	6.4 ft	6.3 ft
Rock dust used wet on top and sides per lineal ft	7.61 lb	...
Rock dust used dry on floor per lineal ft	2.70 lb	...
Total rock dust used on top, bottom and sides per lineal ft	10.31 lb	7.5 lb
Rock dust per square ft	0.241 lb	0.142 lb
Rock dust used per ton of coal mined in the section	2.1 lb	1.5 lb
Dusting time per lineal ft	0.157 min	0.105 min
Dusting time per 100 sq ft	0.362 min	0.206 min
Nozzle stoppages per shift	2.9 times	0
Time lost due to stoppage of nozzle per shift	8.9 min	0
Rock dust per ton of coal mined (re-dusting, haulages, airways, etc.)	0	3.4 lb

Special rock dust samples were taken from the slate roof and the following data were obtained:

	Net Weight grams	Moisture, per cent	Incombustible, per cent
A 6-in-wide strip of wet rock dust taken from the roof 72 hr after being applied	238.5	11.7	100.00
A 6-in-wide strip of dry rock dust taken from the roof 10 days after being applied	32.3	5.6	97.00

From the data shown, it can readily be observed that after correcting for moisture and incombustible material the indication was that in the event of an explosion one of the advantages of wet rock dust over dry dust is that approximately seven times more wet dust adheres to the roof than dry dust.

Tests for moisture were taken of rock dust where it was applied wet. The following data were obtained:

Interval between wet application and sampling	Moisture, per cent	Humidity, per cent
Immediately	35.00	75
5 hr	14.99	75
15 hr	6.73	75
4 days	0.34	75
15 days	0.10	75
34 days	0.10	75
49 days	0.10	75

From the data shown, it can be concluded that it takes about four days for the moisture to evaporate from rock dust applied wet.

Samples of the air were taken during the time wet rock dust was being applied and showed the dust count to be as follows (The dust count taken before starting to apply wet rock dust was 1,000,000 dust particles per cu ft of air.):

- Sample taken in a dead-end entry, 36 ft inby the last open crosscut. The application of wet rock dust started at the face of the entry and retreated toward the open crosscut. The sample showed 64.3 million dust particles per cu ft. After 30 min this concentration of dust was reduced to 3.7 million particles per cu ft.
- Sample taken in a dead-end entry 40 ft inby the last open crosscut and retreated toward the last open crosscut. This sample showed 56.3 million dust particles per cu ft. The air deflected to the face was less effective when this sample was taken and after 30 min the dust count was reduced to 22.8 million dust particles per cu ft.
- Sample taken in an open cross-cut next to the face of the entry in a moving air current showed 36.9 million dust particles per cu ft. After 30 min this was reduced to 3.8 million dust particles per cu ft.

The average time of two men dusting on each shift was 53.11 min or 12.99% of the shift. Since dusting progresses so rapidly, exposure time to the increased quantity of dust would be short.

Wet rock dust was applied to approximately 10,000 lineal ft of surface during the first 3 mo of the experiment.

At Leisenring No. 3 mine, Uniontown, Pa., the Pittsburgh seam of coal is mined. About 1 ft of coal is left at the top for roof control. The area where the wet rock dust is being applied consists of two entries and crosscuts parallel to a return airway. A Joy continuous miner is used to mine the coal with the mine floor as a surge bin. A 14-BU Joy loading machine is used to load the coal from the floor into a shuttle car that transports the coal to the mine cars. The Bantam rock-dusting machine is kept in the face of the entry when the continuous miner is working in the crosscut, and in the crosscut when the miner is driving the entry. The wet rock dust is applied back of the continuous miner while the shuttle car is making the trip to the loading station. The continuous miner is not stopped while the wet rock dust is being applied. Data compiled on wet rock dusting at Leisenring No. 3 are as follows:

THESE TWO VIEWS show belt heading and intake airway at Lynch 3 mo after application of wet rock dust.

	Rock Dust Applied Wet	Rock Dust Applied Dry
Average width of places	12.5 ft	12.75 ft
Average height of places	7.0 ft	7.3 ft
Rock dust used per lineal ft	5.4 lb	7.7 lb
Rock dust used per square ft	0.14 lb	0.19 lb
Dusting time per lineal ft	0.33 min	0.20 min
Dusting time per 100 square ft	0.83 min	0.50 min
Rock dust used per ton of coal mined in section	2.00 lb	...
Rock dust used per ton of coal mined for the mine (redusting, haulages, airways, etc.)	...	4.60 lb

Tests for moisture were taken of rock dust where it was applied wet. The following data were obtained:

Interval between wet application and sampling	Moisture, per cent	Humidity, per cent
2 days	16.7	90
3 days	16.3	91
4 days	16.5	94
7 days	16.1	93
8 days	15.0	94
9 days	16.0	94
11 days	14.9	95
14 days	14.7	97
17 days	13.6	90
1 month	6.2	85
6 weeks	7.2	88

From the data shown, it can be concluded that the humidity of the air was the cause of the moisture not evaporating from the wet rock dust.

Interval between dry application and sampling	Moisture, per cent	Humidity, per cent
7 days	6.2	93
21 days	7.0	95
1 month	4.7	85
6 weeks	6.9	88

From the above data, it can be concluded that after a lapse of time, the moisture content of applied wet or dry rock dust is approximately the same. The moisture is controlled by the humidity of the mine air.

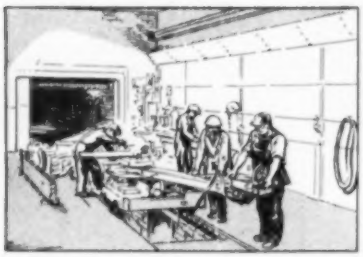
It is our observation after using wet rock dust for 3 mo on an experimental basis at Leisenring No. 3 and Mine No. 32 at Lynch, that it is practical and possible to apply wet rock dust during the continuous-mining cycle.

DRY ROCK DUST, spread by shuttle-car drags, is applied to the floor to preserve the roadway.

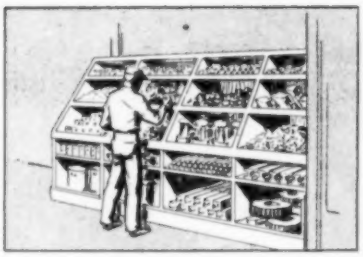
Incombustible Content in Wet-Applied Rock-Dust Samples from Mine No. 32, Lynch, Ky., in Percent

Interval Between Wet Application and Sampling	Return-Airway Samples		Intake-Airway Samples	
12 wk	A*	100.0	A	100.0
	B*	68.0	B	78.0
	C*	82.2	C	80.0
	A	93.0	A	100.0
	B	82.0	B	81.0
	C	77.5	C	81.0
8 wk	A	96.0	A	100.0
	B	86.0	B	68.0
	C	72.0	C	70.5
	A	91.5	A	100.0
	B	54.0	B	62.5
	C	68.0	C	67.0
			A	100.0
			B	58.0
			C	67.0
6 wk	A	100.0	A	94.0
	B	58.8	B	62.5
	C	76.5	C	69.5
	A	90.5	A	95.5
	B	80.5	B	61.5
	C	87.0	C	70.1

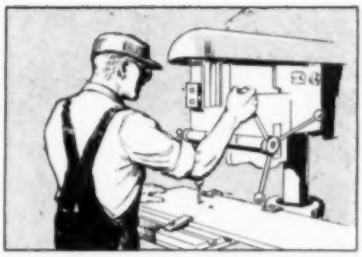
*A denotes roof-and-rib sample, B is a bottom sample, C is band sample.



Start with a well-constructed and well-equipped shop.



Insist on good housekeeping.



Watch equipment handling and care.

Require goggles and shirts at all times.

Give adequate protection to welders.

Prevent horseplay on the job.

How To Put Safety Into Maintenance

By CHESTER WEBB
General Inspector, Accident Prevention Dept.
Eastern Gas & Fuel Associates, Mt. Hope, W. Va.

NO COAL MINE could operate more than a few days at the most without the services of a small group of men sometimes jokingly called "screwdrivers." The more modern the mine the more important they become.

The "screwdrivers" are the maintenance and repairmen. Because they make up a minority group usually working at odd hours, their key role in a safety program is frequently overlooked. There are a number of safety features in their work which should be considered by both management and employee.

Maintenance men are not only responsible for their own safety but also for the safety of practically every man employed. They repair the equipment used to transport men to and from their work. In mechanized mines, they take care of all the machinery used by men on the job.

Maintenance men should realize the responsibility placed on them. They should do all in their power, not only to work safely for themselves, but also to keep the equipment in as good condition as possible to protect all other workmen.

START MAINTENANCE SAFETY IN SHOP CONSTRUCTION

The first steps in safety for maintenance men begin in the shop. The shop should be built of fireproof or fire-resistant materials. It should be well-heated, ventilated and properly lighted for the type of work to be performed.

All incoming and shop wiring should be properly installed in rigid or flexible conduit. All circuits should be properly fused and conduits properly grounded. The installation should comply with the National Electric Code.

All shop equipment should be placed to provide adequate clearances for the work to be performed. Good lighting should be provided. Equipment should be placed so that men on the job can get as much natural light as possible. Yet, care should be taken not to place the equipment so there will be a glare or a blinding light thrown in the operator's eye. This can easily cause accidents.

All electrical equipment should be properly frame-grounded and mechanical equipment adequately guarded.

Sufficient cranes and lifts should be provided so that parts being moved for repair can be handled with the minimum labor. This helps to eliminate accidents, and ruptured or strained muscles. It also expedites the work and enables workmen to direct their energies into more useful channels.

Care should be taken in the selection of cranes, hoists and equipment-handling slings so that they are not strained beyond capacity. No workman should be allowed to perform work under equipment until it has been suspended and suitable safety blocking has been provided.

INSIST ON GOOD HOUSEKEEPING

Good housekeeping and cleanliness are absolute necessities. Otherwise, accidents, poor maintenance and damaged equipment will result. All walk

Adapted from *The Safe Mine Foreman*, published by Eastern Gas & Fuel Associates.

ways should be kept clean and open. Grease and oil accumulations should be prevented. This is especially important when spillage is on the floor. Spillage is both a fire and slipping hazard. Its presence is part of the unclean shop which reflects poor supervision and improper planning.

After repair work has been completed on a piece of equipment, the floor space should be cleaned. All tools should be properly cleaned and stored. All parts that have been removed or not used should be properly disposed of by reclamation, or scrapped. Reclaimed parts should be properly tagged and stored for future use.

Bins provided for different grades or types of scrap help to avoid accumulation in and around the shops. These save money and prevent accidents.

Unguarded stairways and pits in shops have been responsible for some bad accidents. These should be kept guarded and covered.

REQUIRE SHIRTS; GOGGLES

Some men like to take off all their clothing from the waist up during warm or hot weather. The shop foreman should prevent this because their bodies are exposed to flying parts of steel, slag from cutting torches, and the burning rays from electric arc welding. Working outside the shop exposes men to sunburn. Foremen should always remember that sunburn or ray burns reduce a man's efficiency even if such burns do not always result in lost time.

A suitable eye shield or goggle should be worn at all times by all shop maintenance men to protect the eyes. Their own work is not the only hazard in a shop where others are employed. It is important to note that eye injuries have been caused by flying pieces of steel when men are several feet apart. Goggles should also be worn when using high-pressure cleaners. Some types of cleaning fluid require the use of goggles and respirators.

PROTECT WELDERS

Proper enclosures should be provided for all arc-welding work. This can be done by having a permanent enclosure, curtains of approved-type material suspended on rods or wire, or by portable screens. Arc welding done in the open or in and around shops not only causes eye injuries but reduces the efficiency of men.

To prevent eye injuries where welding is being done, signs, such as, "Do Not Watch The Arc Without Proper Shields," should be prominently displayed. These signs are especially good for men passing through the shop who are not shop employees.

All welders should wear eye shields under their welding helmets. This is to protect the eyes from flying slag when the helmet is raised for inspection of welds. Eye shields also protect the operator when he is cleaning slag from the weld with chipping hammer after a bead or layer of weld has been run. Many eye accidents have occurred simply because protection was not worn under the helmet.

Experience has shown that these other safe practices prevent accidents and injuries in welding:

1. Keep welding shields free of openings that allow rays to leak through.

2. Use the proper shade of lense for the type of welding performed.

3. Provide proper ventilation.

4. Ground arc-welding work.

5. Use insulated electrode holders and keep them in good repair.

6. Store and handle acetylene and oxygen tanks properly.

7. Keep valve caps on each tank when gages are not on tank.

8. Clean tanks and prevent them from being knocked or pulled over when not in use.

9. Clean connections carefully before attaching gages to tanks.

10. Remove oil or dust from connections, especially from oxygen connections.

11. Handle gages with care and check them every 6 mo.

12. Use approved-type ferrules, not wire, to clean hose.

13. Keep acetylene pressure to torches at 15 lb or below.

14. Provide suitable tip - cleaning drills or reamers to care for all sizes of tips.

15. Keep welding hose and connections away from oil and grease, and inspect them periodically, especially when used in confined places.

16. Weld in confined places only when additional ventilation is supplied by an outside source, such as, a blower fan or compressed air.

WATCH EQUIPMENT HANDLING AND CARE

All grinding wheels should be well guarded and grinding rests kept adjusted close to the wheel. Grinding should never be done without goggles for eye protection. A bold sign should be posted over all grinding equipment requiring the use of goggles.

All work being performed on shop equipment, such as, drill presses, lathes, planers and boring mills, should be properly clamped and supported. Broken arms or other bodily injuries can occur when large pieces of steel are drilled with large drills on drill presses without being clamped down. Loose clothing should never be worn around moving equipment.

All air or electric drills, when using drill bits above ½ in, should be provided with a "dolly" or "old man" to prevent injuries to the operator.

All riveting hammers should be provided with safety dolly spring clips. Otherwise, they can cause fatal accidents.

The casing of all electric hand tools should be grounded.

Pullers should be properly used to avoid distortion, defacing of parts and injury to men. In most cases these are hardened parts and spalling or flying chips cause injuries, especially to the eyes.

Copper, babbit or composition hammers should always be used in assembling heat-treated gears and machinery parts.

All belting used on equipment should be well guarded.

Workmen should repair electrical equipment without power on the equipment unless power is needed to do necessary work. Repairing equipment with the power on has resulted in injuries.

Repairmen should be sure that steel tubing has an opening large enough to let the gases escape while being heated. Such tubing includes shuttle car flights, underground tipple flights and pipe tubing that has ends sealed. Workmen can be injured if tubing explodes while being heated.

Handling of inflammable materials around shops should be watched closely as failure to do so has caused bad accidents. Severe burns have been received by igniting gasoline or kerosene on workmen's clothing.

Repairmen should never use poorly maintained tools such as mushroom heads on punches, marred hammer faces, bad hammer handles, and wrenches with defective jaws. Ill-kept tools may cause cuts, bruises, strained muscles, loss of fingers, broken bones due to falls, and loss of eyes.

CHECK HORSEPLAY

Horseplay around shops has been responsible for painful injuries to workmen in shops and should be avoided. There are probably more injuries of this type than get on the records.

TWO FLAT CARS and four open-top cars carry 5-cu yd walking dragline in unit assemblies designed to permit fastest erection at new site. Machine is shown at Farmington, Ill., destination after 800-mi trip from Coalgate, Okla.

How to Ship a Dragline

RIGHT NOW you may be up against the problem of moving a large dragline a considerable distance and you're looking for a possible solution. Operating officials of Midland Electric Coal Corp., Farmington, Ill., recently transferred a 5-cu yd Marion 7200 from Coalgate, Okla., to Farmington, a distance of approximately 800 mi, and their experience might be helpful to you.

The unit was shipped by rail on two flat cars and four gondolas, arriving tight and secure at the company's Middle Grove mine in unit assemblies designed to permit fastest erection. The tub and circle rails were separated into halves for shipment, the boom was separated into four sections and the machinery housing into three sections. The walking shoes and walking arms were removed and handled as four separate items.

HOLD-DOWNS for flat-car loads are ¾-in steel rods. C. E. Crawford, chief electrician, finds moorings still tight at end of journey.

H. W. Brentz, Midland's mechanical engineer, went to Oklahoma to supervise disassembly and loading of the machine at its point of purchase. The services of a truck-mounted 15-ton Lorain crane and an operator were secured locally and used 11 days, and a crew of nine Midland men worked 18 days (9-hr shift per day) to finish the job in Oklahoma.

As shown in the illustrations, one flat car carries only the main machinery base, the heaviest package in the shipment, while the other flat carries the right and left wing sections of the machinery housing. All other parts and materials are stowed in the four open-top cars.

Except for the main machinery base, bulkiness rather than weight was a major determining factor in loading. Therefore, a good loading plan is important if the bulky odd-shaped parts are to fit snugly into the cars and are to be fastened effectively. Here are the gondola loads as finally worked out by Mr. Brentz:

WING SECTIONS of main frame, with walking cranks and integral equipment, were unbolted from machinery base to make one flatcar load.

On the Railroad

Car No. 1—Both walking shoes, intermediate section of boom, 5-cu yd bucket, one walking arm.

Car No. 2—Point section and foot section of boom, two tub lifters, one walking arm, four gantry legs, gantry tower.

Car No. 3—Spare bucket, intermediate section of boom, gantry head, and warehouse items, such as, wire rope, replacement parts, sheaves and so on.

Car No. 4—Tub, circle rails and rollers, subbase.

The ballast of the machine, consisting of steel scrap, was loaded into steel drums which were placed in the cars wherever necessary to balance the total loads, thus distributing the burden evenly on the trucks.

The main machinery base, stripped down only as far as necessary to satisfy the weight limit set by the railroads, was much too heavy for the 15-ton crane. It was loaded by jacking and cribbing, until it rested on cribbing higher than the flat car. Bearing sills were built on the car over each of the trucks, then the main machinery base was skidded broadside off the cribbing onto the bearing sills. Splitting the load over the trucks like this eliminated the sag in the car which might have occurred if the main machinery base had been set directly down on the bed of the car.

Hold-downs for the flat-car loads were made of lengths of ¾-in steel rod, securely fastened to both the load and the car to prevent possible shifting of the loads. Conventional nuts for the ends of the hold-down rods were rejected because it was thought they might be loosened by vibration in traveling. Therefore, end anchorages were made by bending the rod back on itself and closing the bend with a weld. Welding eliminated the hazard of having the rod break off at the tight bend. Anchorage to the car was achieved by passing the rods down through the stake holders at the sides of the car, then terminating them below the holders with steel bearing plates also held in place by welded bends.

In the open-top cars the parts were tied together with wire rope or steel wire to make the loads ride as a unit as much as possible. The idea was to maintain the initial weight distribution throughout the trip.

Mr. Brentz notes that maintaining proper side clearance is of prime importance in railroad shipping. That is why the wing sections of the cab were unbolted from the main machinery base and loaded on a separate car. One of the wing sections houses the swing generator and its diesel drive, which were loaded with the wing section without disassembly.

Wood blocks, fastened to the beds of the cars with large nails or drift pins, also were used to secure the loads from lateral shifting. All in all, the fastening job must have been well done because when the train arrived at Farmington the hold-downs still were tight and no shifting was evident.

BULKY DRAGLINE PARTS, like boom sections, in open-top cars are tied together with wire rope to prevent motion and shifting of weight during long trip.

Hendrix mine, Consol (Ky.), changes from outside to underground haulage—Cars are loaded automatically at belt heads—One man handles entire main haulage including dumping

25-TON MINE CARS, equipped with end extensions to prevent spillage between cars, are automatically loaded at this transfer point. High-capacity cars are hauled outside by a 20-ton tandem locomotive through openings brushed to height of 11 ft.

Using 25-Ton Cars Underground

MINE CARS CARRYING 25 TONS on an underground haulway in a 42-in seam are moving coal at low cost per ton-mile at the 4,000-ton Hendrix mine of the Consolidation Coal Co. (Ky.), Div. Pittsburgh Consolidation Coal Co., at Deane in Letcher County, Ky. The large drop-bottom cars, automatic loading at the belt heads and electric track switches enable one man per shift (the motorman) to handle the entire main haulage. Present load-

AUTOMATIC LOADING is monitored by three limit switches (two shown at left) and ball-type coal floats (right) which govern operation of car-spotting hoist and belt conveyor by communicating loading conditions to control relays.

ing points are 3,800 ft and 4,250 ft inby the portal. The outside section of the haul is 500 ft to the headhouse. The round-trip distance, including switching, is 2 mi. The one remaining outside loading point is 1 mi from the headhouse, and coal from this location is hauled on the outside tramroad. The mine is in the Elkhorn No. 3 seam and is currently producing 3,500 tpd (clean coal).

Hendrix was opened in 1949 and is 17 mi by highway from Jenkins, the company headquarters. The mine was planned for operation the first 10 yr by contour mining; that is, operation from a series of portals along the crop line. For this haulage 25-ton cars were purchased and full automatic loading controls were developed and installed (*Coal Age*, August 1953, p 99).

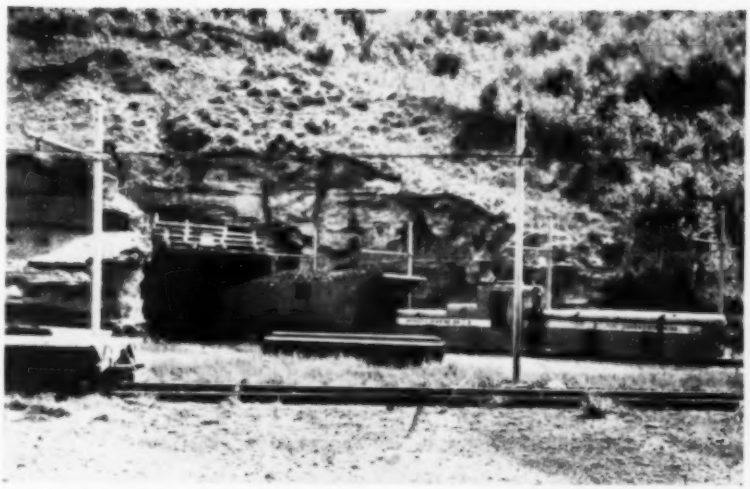
Haulage Cost Advantage

When the time came for planning underground main line haulage from section belts to recover the main body of the coal, previous experience and available data brought an early decision that it should be track haulage. A study to determine size of mine cars was made, and to arrive at a convincing conclusion the fact that 30 of the 25-ton cars were available was not taken into consideration. Comparing the 10-ton and 25-ton cars, the study indicated that the smaller would result in a ton-mile cost of $0.069 while the 25-ton would provide haulage at $0.058 per ton-mile.

Accordingly it was decided to brush the haulage heading for the 25-ton cars. These are 8-wheel Sanford-Day units, 30 ft long, 8 ft wide and 6 ft 2 in high above the rail. Gage is 42 in. The present complement of 35 cars serves two inside loading points and the one remaining contour mining loading point.

A 9-heading main entry had been developed as sections of the contour mining, except that two areas of thin coal had been skipped. Developing the new haulway consisted of brushing the center heading of the entry and driving tunnels through the thin-coal areas. At present the brushing operations have extended to a point 6,500 ft from the portal and the present brushing work is 4,400 ft short of the development in the coal. Ultimately the underground main line track will total 3.52 mi, including branches.

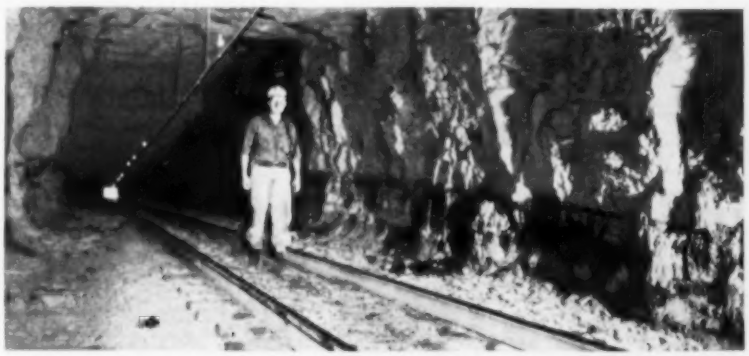
Excavation of the tunnel and brushing operations provide 11 ft minimum vertical height and 16 ft width. The trolley wire, for pantograph collectors, is placed on the center line of the track and 8 ft 10 in above the top



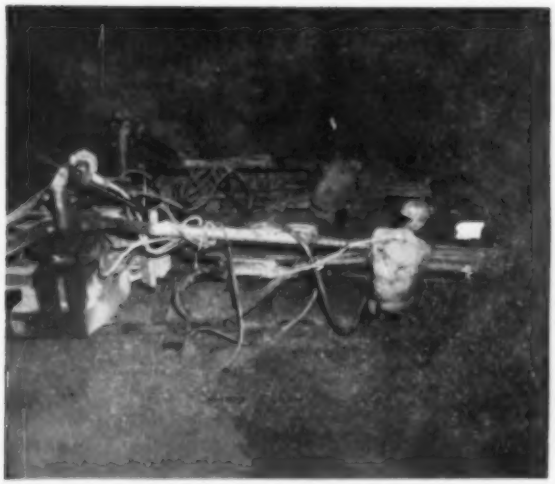
20-TON TANDEM LOCOMOTIVE, with centered pantograph collector, emerges from Hendrix portal. Locomotive operator is the only employee on main haulage.

BOTTOM-DUMP CARS are unloaded into 400-ton concrete hopper to serve feed conveyor of cleaning plant. No attendant is required at car dump.

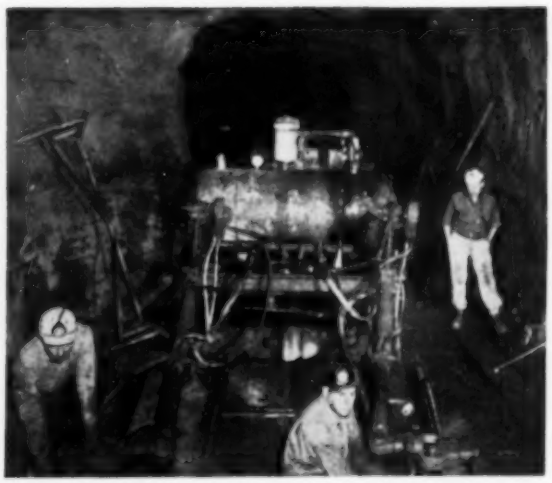
High-capacity haulage demands top-notch construction



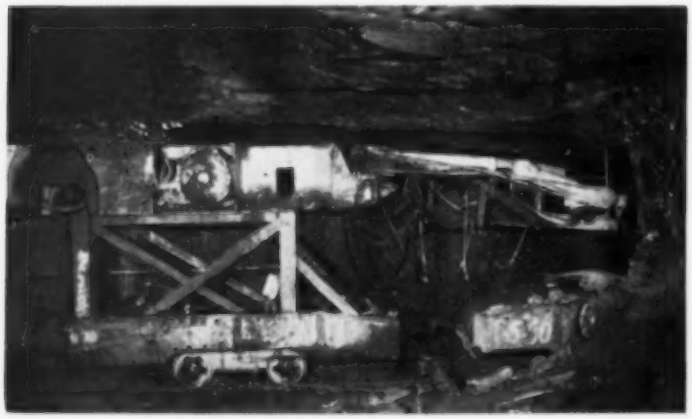
80-LB IRON, stone ballast 10 in deep under ties, aluminum feeder and trolley wire 8 ft 10 in above top of rail are features of Hendrix haulageway.



TWO-MAN CREWS brush 7 1/2 ft of bottom rock to make headroom. A foot of top rock also was taken down here.



TWIN-BOOMED DRILL JUMBO, with 250-cfm compressor, was built on 8-wheel supply car especially for brushing.

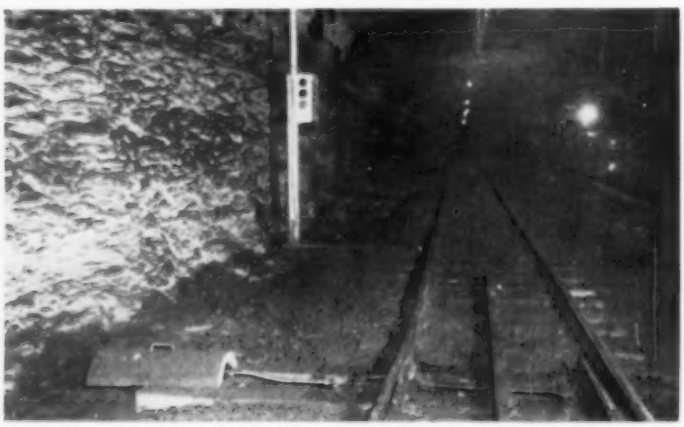


ROOF-BOLTING MACHINE consists of converted timbering machine mounted on a lift-endgate mine car.

DRILLER operates wet rotary drill on elevated unit. Bolts are set on 4-ft centers.

Special equipment and positive controls needed for operating coal expressway

ALUMINUM FEEDER (A), 5,000 ft long, connects to copper feeder (B) near portal.



ALL TRACK SWITCHES are operated by electric throws and switch positions are indicated by signal lamps.

of the 80-lb rail. Ties are 5x7 in by 6 ft, pressure-treated. The track is ballasted with No. 6 crushed stone to a minimum of 10 in under the ties. Bonds are long arc-weld type. Switches serving side tracks are operated by Cheatham electric throws controlled from push buttons on posts and reached by the motorman from his cab.

To drive the tunnel, brush the heading and ballast the track, special equipment was purchased or assembled locally with the least possible labor. For percussion drilling a Le Roi-Cleveland-Westinghouse 250-cfm compressor and two jumbos of the same make were mounted on an 8-wheel Differential Steel flat car formerly used for transporting supplies. All rock loading has been done with a Joy 14BU machine. For roof-bolting (rotary drilling), a Baker timbering machine was fitted with a Duncan wet-drilling head and the whole machine was mounted in an elevated position on a lift-endgate mine car. The head was designed and built by D. C. Duncan, superintendent of the central shop at Jenkins.

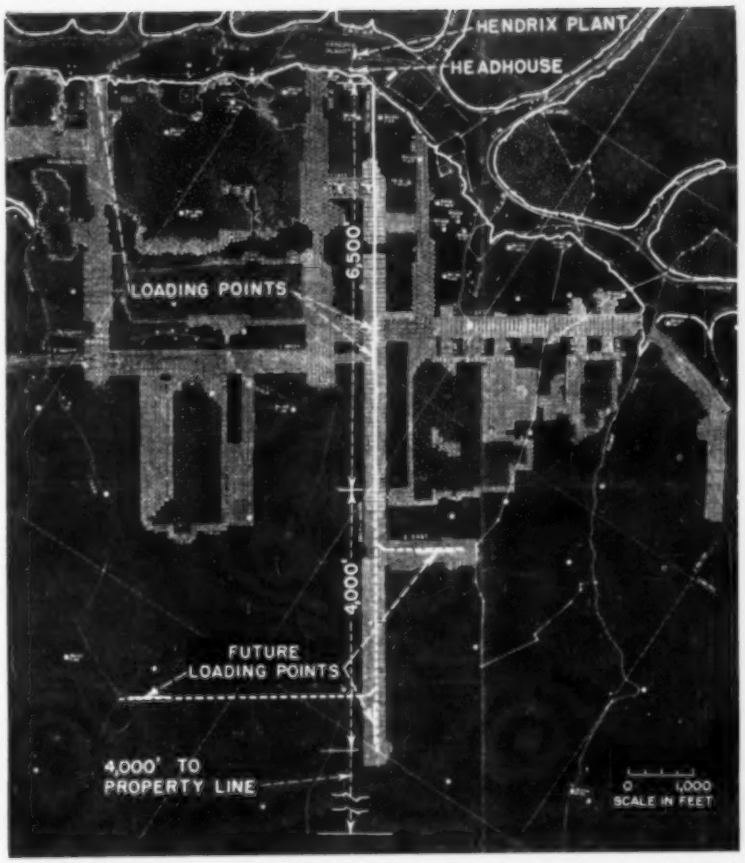
The brushing crew is made up of only two men per shift and the work is carried on three shifts. The two men drill, shoot, load, gather and dump loaded cars, bolt the roof and extend temporary track. Drill stems 14 ft long are used and the advance per cut averages 12 ft. Three cuts are loaded out in six shifts. Shooting is done with American Cyanamid 1¼-in permissible rock powder.

Roof bolts are placed on 4x4-ft centers except where the pattern is varied to suit local conditions. They are anchored with expansion shells. Both lengths range from 3½ to 6 ft; those 3½ ft long are ⅝ in in diameter and the longer ones are ¾ in.

Rock Dust Distributor

For distributing rock dust an 8-ton 8-wheel car with two body-width adjustable-opening bottom-dump gates, built to coal company specifications, was purchased from Differential Steel Car Co. (*Coal Age*, October 1953, p 116).

Local grades of the coal seam range up to 10%. Maximum grade of the haulway has been held to 2% in favor of the loads. The brushing takes top or bottom as necessary to maintain grade but, where practical, grading is in the bottom so as not to disturb the roof strata. Starting at the portal the established grades are: first 1,300 ft, plus 0.23%; 1,000 ft, minus 0.5%; 1,000 ft, plus 0.5%; 1,300 ft, level; 1,140 ft, plus 1.3%; and 500 ft, plus 2.0%.



NEW HENDRIX HAULAGEWAY—Heavy sol'd line indicates completed brushing and haulway; broken line indicates projected brushing and construction.

The present loading points, 3,800 ft and 4,250 ft from the portal, are on level track. The next loading point, to be installed about June, 1956, will be 7,750 ft from the portal. Brownie automatic hoists control the cars.

Electric limit switches on wheels rolling against the sides of the cars and ball-type "coal floats" hanging adjacent to the coal stream flowing into the car make the loading fully automatic. An apron extension at one end of each car to lap the next car prevents spillage while the hoist makes the car change.

This underground haul is handled by one 20-ton tandem unit built up in the company shop from two 10-ton General Electric locomotives. The operator has an enclosed cab to protect him from weather on the outside portion of the haul. Six cars comprise the usual trip. Seldom is a whole trip of empties set in at one loading point. Empties are added as necessary to the inby end of the trip being loaded and loaded cars are pulled from the outby end, thus always leaving a few empties at the loading point. At the plant the drop-bottom cars are dumped by the motorman into a 400-ton concrete hopper.

Aluminum Feeder Line

An aluminum feeder line, hung on combination hangers with the No. 9-section 400,000-cm trolley wire, is 1,590,000 cm in cross section, which is equivalent in conductivity to 1,000,000-cm copper. The aluminum cost less than one-half of copper and now that copper has increased in price the spread is even greater. Two thousand more feet of the aluminum feeder will be added in the near future. The entire haulageway underground is illuminated with 50-w incandescent lamps on 50-ft centers.

At present about 75% of the Hendrix tonnage is transported over the new underground haulway. This percentage is approximately 3,000 tons of raw coal per 3-shift day. Eventually, when the contour mining is finished, all the tonnage will move over the haulway.

CARE IN HANDLING FOREST STANDS and in marketing forest products points the way to . . .

Managing Forests For Profit

Island Creek forestry experiment studies better ways of managing coal-owned timberlands. Initial data point to this conclusion: more efficient integrated systems of planting, cutting and milling can fill needs for coal-mine materials; turn a profit in high-grade lumber; ensure sustained yield of forest products.

By JOHN F. L. BELL, Assistant Forester, in Charge of The Island Creek Experimental Forest

And ALLEN W. GOODSPEED, Forester, West Virginia Agricultural Experiment Station and Director of University Forests

BETTER MANAGEMENT of forest resources by coal and land companies is the object of a large-scale forestry experiment now underway in southern West Virginia. Through the Island

STEEP HILLY COUNTRY, looking across the Paw Paw unit, is typical of southern West Virginia and eastern Kentucky. Beech tree right, one of many undesirable species found in area, was poisoned to aid the growth of younger trees.

DIESEL MILL on Paw Paw unit heightens efficiency in making quality lumber.

Creek Experimental Forest, a comprehensive effort is being made to integrate forest production, product manufacture and marketing into a more efficient pattern than commonly employed. The procedures sought must be practical in nature and suitable for application to similar areas. Experience to date shows that improved growth and yield practices are feasible. More conclusive results can be expected as the research progresses.

The 3,000-acre research forest was set up in Mingo County, W. Va., through an agreement made between the Board of Governors of West Virginia University and the Island Creek Coal Co., Huntington, W. Va. The agreement, signed Oct. 3, 1951, runs for 10 yr and is renewable at the end of the period. Control over the research program was given to the Div. of Forestry of the university's Agricultural Experiment Station. However, the work of the program requires and is receiving full cooperation from the Island Creek Coal Co. and the primary contractors involved.

In seeking better management of forest resources, the ultimate goal is sustained-yield production, where annual growth equals annual harvest. Since forestry in southern West Virginia is a relatively new profession, much effort is therefore being directed toward proper handling of forest stands. More concretely, this means establishing a satisfactory growing stock and maximum growth of high-value desirable tree species. It also means that care in manufacturing and marketing forest products is essential to obtain a high stumpage value from the standing timber.

To carry on the forestry work under the terms of the agreement, a project entitled "Timber Management for the Market Demands in Southern West Virginia Forests" has been set up by the Div. of Forestry. The project aims to fix timber product goals for southern West Virginia hardwood forest types. It also aims to devise and test systems of stand management capable of producing desirable timber suited to the needs of the forest owners. A full-time professional forester is stationed at Holden, a location which permits him to direct the forestry operations in close cooperation with Island Creek personnel.

AREA TYPICAL: Ripe for Improvement

The 3,000-acre forest is located near the town of Dingess. This site was selected by the university as representative of the region in topography and in timber resources. It lies in steep, hilly country typical of most of southern West Virginia and eastern Kentucky. Topography divides the tract into five natural logging units ranging in size from 250 to 750 acres. The operational history of the forest is characteristic of the region. Cutting in the past took the better trees and left the poorer, a procedure commonly called "high-grading." The last cutting on most of the forest was completed about 40 yr ago. Basal injury to trees of all ages in the present timber stands indicates the frequent occurrence of fires in the past.

The 553-acre Paw Paw logging unit was selected for the initial operation in the forest. This unit embraces the drainage of the Paw Paw branch of the left fork of Laurel Fork and Pigeon Creek, Mingo County. The major drainage of the Paw Paw branch is to the northwest, but all aspects are represented among the smaller hollows within the unit. Elevation above sea level ranges from 850 to 1,750 ft. The ridge tops are generally 800 ft above the valleys with slopes ranging from 45 to 75%. More than 90% of the area is made up of these steep slopes. The remainder includes narrow ribbons of gently sloping land along the valley bottoms and a few gently sloping ridge tops. There are many large rocks and fall rock hollows.

The forest cover types of the Paw Paw unit are Appalachian hardwoods. These occur principally in the form of even-aged stands although some, as a result of past cutting and fires, may be considered uneven-aged in character. Poor oaks and hickories occupy the exposed drier sites. Oaks, yellow poplar, beech, basswood, black gum and maples are found on the protected moist sites and in the coves at the drainage heads.

A careful inspection of the Paw Paw unit revealed many trees that were overmature, defective, or of undesirable species, a common situation in the region. This suggested that the first operation should be an improvement or conditioning cut designed to remove these trees and leave the unit in better shape for future timber production. This cutting has now been completed on the unit.

PLANNED PRODUCTION: Fit System to Species

All merchantable material cut from the Paw Paw unit has been manufactured into marketable forest products. However, because of past cutting practices, a large amount of inferior species, particularly beech, was found in the stands. Also, many large trees were so defective, as a result of past fires, that they were unmerchantable. The worst of these cull trees have been poisoned, making the area they now occupy available for growing better timber.

Through lack of owner interest and inadequate technical supervision, fires and a "loggers' choice" type of cutting operations continue to degrade many areas of timberland. Planned forest production involves the application of silvicultural systems to the forest stands. These systems include definite methods of cutting and regenerating the forest. Four such methods were selected for trial in the Paw Paw unit. They are as follows:

1. The Seed-Tree Method—Produces an even-aged stand. Suitable for light seeded and light demanding species. The existing stand is removed except for seed trees of desirable

MINE WEDGES are manufactured from material unsuitable for lumber, leaving best cuts for profit markets.

CONVENIENTLY LOCATED STACKS of sorted material enable quick filling of orders for graded lumber.

species which provide the reproduction.

2. The Shelterwood Method—Produces an even-aged stand. Suitable for heavy seeded and light demanding species. The old stand is removed in successive cuts and reproduction is established in the openings created. The remainder of the old stand is removed when reproduction is established.

3. The Selection Method (10)—Produces an uneven-aged stand. Suitable for many species if carefully applied. The old trees are removed from the stand as individuals or in small groups at approximately 10-yr intervals.

4. Selection Method (20)—Similar to the preceding selection method except that the cuts are heavier and the period of return is about 20 yr.

Although the cutting on the Paw Paw unit was essentially a forest-conditioning operation, every effort was made to start the establishment of the silvicultural methods described above. In so doing, the unit was subdivided into 12 definitely defined compartments. One silvicultural method was assigned to each of three compartments, thus providing desirable duplication. Future cuts will attempt to develop the assigned method in each compartment. In allotting the silvicultural methods to the compartments all possible advantage was taken of existing stand conditions. The shelterwood method was assigned to Compartment 12, for example, because there existed an overstory of oak under which there was well-established reproduction.

SYSTEMS EVALUATION: Layout and Records

When the silvicultural methods had been assigned, a 100% tally of all trees 12 in in diameter breast high and over was made for each compartment. Trees to be removed were marked with yellow paint and their tally kept separately from those to remain. Subsequent operational records have been kept by compartments to permit a comparative evaluation of the results.

The experimental layout of the compartments and the timber volumes selected to be cut and left in 1,000 bf units are presented in Table I.

The timber cutting and sawmilling operation was performed according to a contract signed by the Island Creek Coal Co., the contractor, and West Virginia University. Penalties were prescribed in the cutting contract to insure proper operating procedures in the woods, proper use of the material cut, and the prevention of unnecessary damage to the trees left. Cutting was done with crosscut saws, skidding with teams, and hauling to the mill with trucks loaded from skidways.

REPRODUCTION: Secure By Cutting Method

After cutting was completed, some 200-mil-acre reproduction study plots were permanently located on the ground in the Paw Paw unit and a 100% tally of all tree reproduction was made on each plot. With subsequent tallies this work will show the occurrence, survival and progress of tree reproduction. It should give an early indication of the success of particular silvicultural cutting methods in restocking the area.

The first reproduction count indicates that planting is unnecessary in this area when establishment of the new stand by natural reproduction is secured by the application of sound silvicultural systems.

BETTER GRADE LUMBER: Save For High Price

The cutting contract called for cutting mine materials in sizes needed by the coal company. At the same time, it called for cutting the maximum possible amount of Number 1 Common and better-grade lumber from the more valuable species. Thus high value material was put on the lumber market instead of using it at the lower price of mine materials. The coal company received a percentage of the total sales price of the lumber so marketed as compensation for the diversion of this material from mine use. Such an arrangement provided a wide latitude in utilizing the products of the forest.

The contractor installed on the mill site a Frick No. 1½ diesel circular mill with a power pump for log washing, a log turner, an edger, a double-end trimmer, a cut-off saw, a slab conveyor, a sawdust blower and a mine wedge machine. Much of this machinery is not commonly found in saw mills, but all of it contributes to the efficient manufacture of quality wood products.

The mill site is near but not on the Paw Paw unit. It was selected to provide ample space for stacking the lumber as manufactured. This per-

mits air-drying the product and also does away with the necessity of forced sales at sacrifice prices, sometimes necessary when storage space is not available. These considerations are important when high-grade lumber is to be produced.

SAWYER SKILL: Vital to Operation

Of particular importance in manufacturing grade material is the skill of the sawyer at the mill. The sawyer must know how to saw accurately to prevent miscut lumber. He must also have a good understanding of lumber grades to know how many boards to cut from a log before converting the remainder into mine material. Approval of the sawyer by the university's forester was provided for in the cutting contract. A considerable amount of low-grade material must be sawed in squaring up mine materials to the proper dimensions, but a good sawyer can keep this to a minimum.

Each Monday the contractor received mine orders for the week from the coal company. This mine material had to be sound in content, free of bark and accurately sawed. Delivery at a company mine or the company treating plant was required. Each piece was inspected by the company at the time of delivery and rejected if it did not meet specifications. This rigid inspection is a sound policy of the Island Creek Coal Co. However, the sawmill did not get the overrun obtained by other mills sawing mine materials to less rigorous specifications. The contractor was paid the same price for the mine material that the coal company paid other mills operating in company timber.

OPEN MARKET LUMBER: Seek Fair Grading

The lumber produced by the mill and not used for mine materials was sold by the contractor at the highest prices obtainable. Considerable improvement was made in marketing the graded lumber. At the start of the operation, checks were made on a number of buyers. These showed that grading practices varied considerably between buyers. Some buyers undergraded to an extent that offset the much higher prices they were willing to pay per unit of product. Better results were secured by selling lumber to firms paying lower unit prices but giving a fair grade to the product. Most of the lumber was graded at the mill. Lower grades were sorted out and sold to local customers for building barns, garages, etc., and for a higher price than could be secured on the grade market.

Table I—Paw Paw Layout and Timber Cut Record

Compartment	Area	Silvicultural Method	Cut M. B. F.	Leave M. B. F.
1	57	Seed tree	256	97
3	72	Seed tree	238	86
10	26	Seed tree	42	34
	155		536	217
2	57	Shelterwood	159	50
6	25	Shelterwood	79	22
12	34	Shelterwood	77	34
	116		315	106
5	43	Selection (10)	21	40
7	31	Selection (10)	83	81
9	45	Selection (10)	90	62
	119		194	183
4	39	Selection (20)	54	49
8	78	Selection (20)	160	94
11	46	Selection (20)	55	91
	163		269	234
Grand Totals	553		1,314	740

Table II—Milled Products and Sales Return

Product	Volume M'fd.	Average Sale Price
Mine timber	1,137	$39.43
Low grade lumber (Below #1 com.)	353	51.00
High grade lumber (#1 com. & better)	180	110.60
Totals	1,670	$49.55*

*Weighted average sales price.

SORTED LUMBER: Air Dry for Added Return

Air-drying sorted lumber in stacks requires from 90 to 120 days. Buyers will pay about $10 more per M.B.F. for air-dried than for green lumber. The principal purpose of stacking most of the lumber was to have available trailer truck loads of one kind for delivery direct to a purchaser. By holding the lumber long enough to collect sizable quantities of one grade and species, orders were filled at $40 or $50 more per M.B.F. than could be obtained by selling green mixed lumber.

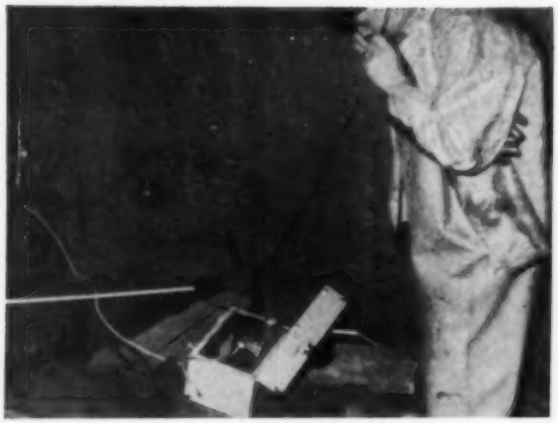
During the summer months the lumber from two valuable species, basswood and yellow poplar, tends to blacken when piled in standard stacks. By endstacking the lumber through this period such damage was controlled. Also, the lumber dried so rapidly that it was salable as air-dried lumber after 30 days.

TOTAL MILLED: Average Price, $49.55 Per M.B.F.

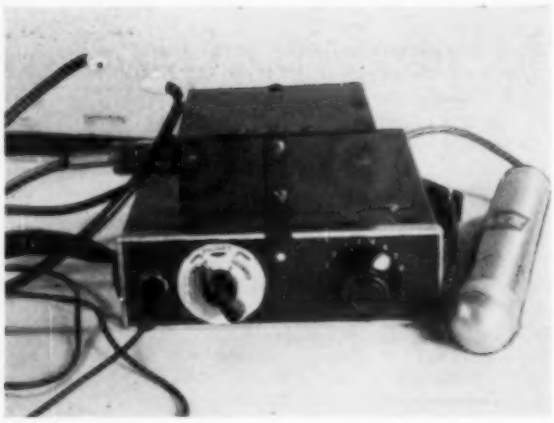
The results of the milling operation are presented in Table II. The table shows the volume manufactured in 1,000 bf units and the average price per volume unit for completed and agreed upon sale.

PROJECT FUTURE: Geared To Stumpage Values

At present the university is subdividing the remainder of the forest into logging units and compartments to facilitate future administration. During inclement winter weather a computation of stumpage values by species for this area is planned. This will be based on the records of logging, milling and hauling costs, and on the final market price of the products produced from the Paw Paw unit. An overturn method of appraisal will be used in which stumpage values will be arrived at by subtracting from gross income the logging and manufacturing costs, depreciation and a margin for profit and risk. By determining stumpage prices, it is felt that attention will be directed to the value of standing timber, a value sometimes not well understood in coal-company operations.



PROBE in drill hole picks up noise. Ear can tell rock sounds from other noise; recorder can't.



NUMBERED SETTINGS on amplifier volume control are used to get distance to rock activity.

Predicting Rock Falls

Electronics, plus the old-reliable human ear, are the key ingredients in a new system of predicting rock failures and falls in mines and tunnels. The details are presented in the following material, adapted from the December issue of Engineering and Mining Journal, McGraw-Hill's metal and nonmetallic mining publication.

By LLOYD E. ANTONIDES
Assistant Editor,
Engineering and Mining Journal

YOU CAN NOW TELL if, when and where a roof fall will occur, says F. J. Crandell, chief engineer and vice president of Liberty Mutual Insurance Co., Boston, Mass. It is done by counting subaudible sounds made by rock over a period of time.

Method has wide application. It can test the effectiveness of roof bolts, or any other ground support—steel, timber, concrete, etc. It can tell if support is needed in any given area. It can warn miners of approaching hazardous conditions. Effectiveness of scaling can be determined and haulageways can be checked for unseen "loose." And it can do all this more accurately and more positively than any miner "sounding the back" with his bar or pick.

Equipment and procedure are simple. The apparatus is inexpensive (about $500) and easily portable. See photo. It consists of a geophone (probe), an amplifier and earphones. A hand counter and a watch are also used. The probe is simply placed in a drill hole (over 3 ft deep is best) and an observer listens to the ground "talk." A 15-min listening period has been found practical. Total number of noises is then converted into an average count per minute for the period. Comparing rate with a previously determined rate at failure, tells just how stable the ground is.

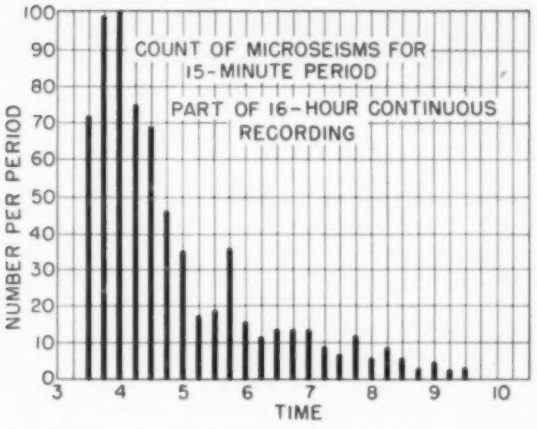
F. J. CRANDELL, developer of electronic roof testing.

Most interesting detail of equipment is the geophone or probe. Heart of the hollow 1x8-in round-nosed cylinder is a synthetic quartz pick-up. Developed by Mr. Crandell during his first tests in a water supply tunnel, it consists of two silver-foil-covered crystals placed side by side. One end of the rectangular pair is mounted in a circular metal base which fits inside housing (see photos above). Piezoelectric action of quartz, as minute movements bend crystals, gives current flow. Ordinary battery-powered amplifier raises pulses to audible level which are heard through simple earphones.

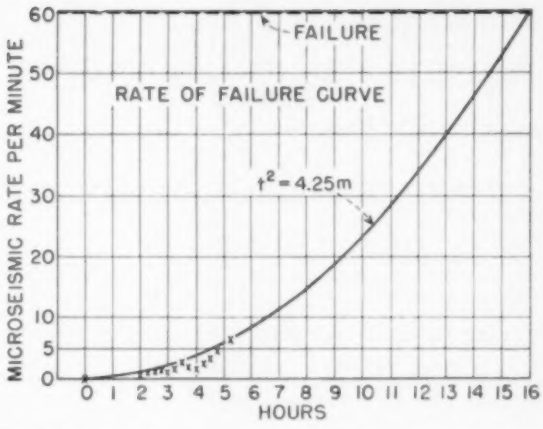
Recorders can be used, but Mr. Crandell feels they are not too practical in normal work. Their power requirements and bulk are inconvenient, and they do not discriminate between rock and manmade sounds.

Maker of the equipment is Walter Nold, Natick, Mass. Liberty Mutual retains the patent on the geophone but does not restrict use or purchase of the apparatus to policy holders. A number of American and foreign mining companies have bought the equipment and are using it. But, Mr. Crandell cautions, getting the equipment is not the only problem. Procedure and experience are highly important.

Field procedure is just as simple as outlined above. Probe is placed in drill hole and 15-min count is recorded. Man is the best monitor, says Mr. Crandell, not only because recorders



RESULTS AT SLATE MINE show how microseismic rate drops as roof becomes stable after blast.



TO TELL if and when roof will fall, two readings must be compared on this-type curve.

are inconvenient but also because man can disregard extraneous noise. This is almost impossible to eliminate completely in producing mines and tunnels, and even the instrument itself makes noise.

Characteristic sounds produced by microseisms are interesting. Limestone gives sharp, pattering sounds, like ball bearings falling on stone or rain on a window pane.

Shale may sound like creaking of timber (one or two large intermittent noises), or hollow rumbling of loose coal in a wood chute.

In slate the sounds change with the rate. At a low rate they are intermittent dull clicks gradually coming in longer groups as rate increases. At high rates clicks come in rushes with intermittent sound of flowing sand. At times sharp crackling like radio static drowns, out the spurts of clicks. And at the highest rate monitored, sharp snapping is heard at intervals above the cracking and steady spurts of clicks.

Of the extraneous noises, talking is easy to spot. But mining machinery, such as cutters, often produce same sound as falling rock. And some drills for example, completely mask all natural rock noise. Even foot shuffling by the listener will be heard, as will brushing against the rib. Trips, fans and power hum are other sounds picked up. Some of these can be cut out with the attenuator on the amplifier, others by the listener. And, of course, some can only be eliminated by monitoring when workings are idle.

Noise made by the instrument itself is often much like rock noise. For example, it may give spasmodic or regular bell tones (musical) or sharp crackles similar to crushing cellophane (unless loud "tunk" or crackling sounds are intermingled with them). Most can be recognized only after some experience.

Mr. Crandell feels an engineer or technician needs 2 or 3 wk training to get familiar with the whole scheme. He emphasizes that it should be given before trying to apply the method to actual operations. He suggests that those interested contact him at his home office.

KEY TO PREDICTION

Key to interpretation is finding the noise rate at failure for the rock in each mine. It is not difficult and can be determined in the laboratory or in the field. Liberty Mutual engineers found that a simple compression test gives a fair indication of what the microseismic rate at failure will be. But Mr. Crandell feels pressure is not the major problem and prefers to make a more accurate test by simulating the geological condition.

In one instance, at a slate mine where folding had turned the beds vertical, he felt failure came from slip along weak bedding planes. So to find faliure rate he placed one slab of slate on top of another, then listened while he pulled the top one until it just slipped. Field work proved him correct. Noise rate at failure also can be determined in the field by measuring activity immediately after a shot or over a period when a fall takes place.

To give a time prediction, Mr. Crandell constructs a "rate of failure curve" for the rock in question. He gets this by monitoring activity immediately after a shot (failure) until the time the ground becomes stable. Plotting the results against time gives a curve which, when reversed, tells what can be expected as stable ground becomes unstable and goes to failure. See graphs above.

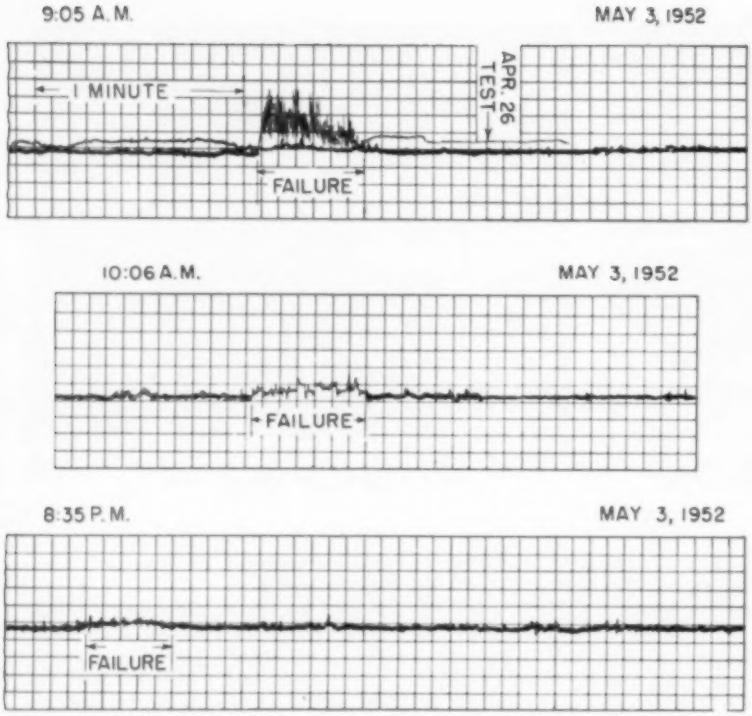
Each rock has a different curve but all are parabolic. They are of the form $t^2 = k\,m$, where t is time, m is microseismic rate, and k is a constant for the given rock. To use it, two readings are taken in the field. Time between readings is recorded. Then by comparing the change in rate for that period of time as against the change shown on the graph for the same period, it is possible to tell if and when the rock will fail.

Note that this typical rate of failure curve has a dramatic and sinister implication—rock failure starts slowly, then speeds up. Frequently a miner will bar or wedge a piece of rock which appears loose. But failing to bring it down after some time, he feels it's safe. Later the piece suddenly falls without warning and often with damaging effect. What happens is that his barring starts the piece toward final failure, which goes very slowly at first but very rapidly toward the end.

Location of an area that is failing is based on loudness (amplitude) of the microseisms. Since intensity varies as the square of the distance, a graduated attenuator on the amplifier is used to measure this. Characteristic sounds also aid in locating activity. Close by, the noises have a tone-like quality. Further away they are scratchy.

One point Mr. Crandell made quite strongly: the method will be effective only when used as a long-range, continuing program. He suggested that mine survey crews make periodic surveys and the safety engineer review and maintain records. Such a plan promises much to the mining industry.

This scheme of determining stability of rock openings has a fairly long history. As Mr. Crandell says in his



RECORD AFTER BLAST during first test in tunnel is typical of recorder results. Height of line is disregarded in determining failure rate.

paper, presented to the Boston Society of Civil Engineers in January, 1955: "For years, the safety of the roof and underground workings has been determined by visual and audible indications, and upon the opinion and experience of the responsible people in charge. The evaluation of these visual and audible indications has been difficult, and all too often has proven to be false. These qualitative determinations have been so grossly in error at times that extremely dangerous and unsafe roof conditions have occurred rapidly enough to escape detection. It was obvious that there was a need for a more quantitative or quasi-quantitative means of determining the safety of underground roof conditions, to improve the environment of the men working in this industry.

"A fact well known to mining and tunnelling engineers is that certain types of rock tend to make audible sound under strain, and this type of rock has many times been called 'popping rock.' It is very easy to imagine that if there are audible sounds at failure, very likely subaudible sounds have been occurring in the material before the failure occurred.

"As the nation's largest writer of workmen's compensation insurance, we are primarily interested in the protection of the workmen against injury and death. Fall of rock has been the number one killer in tunnelling and mining.

"Before this research was initiated, the U. S. Bureau of Mines experimented with subaudible apparatus in deep mines subject to bursts.

"The determination that the microseismic rate of a geological specimen under crushing strain increases as it approaches failure had already been established. This has been shown in relatively deep workings and in relatively hard rock.

"One of the problems was to determine whether the same basic characteristics could be developed in shallow workings with very minor amounts of pressure upon the roof and in exceedingly soft rocks, such as, limestone, sandstone, shales and clayey shales. This research was started in the East Delaware tunnel in the section at Roscoe, New York, for the Board of Water Supply of the City of New York." The work lasted for several years, starting in 1950.

The tunnel work gave good results. Equipment similar to that of USBM was used at first and it showed microseismic disturbances could be detected in soft shale and limestone. It also showed up difficulties. The most disturbing obstacle was extraneous noises —air and water flow, talking, equipment, and especially the 60 cycle hum of electric power. This experience showed that a recorder, though useful, has limitations not only of bulk but also of discrimination. Man himself proved the best listener.

It was here that the patented microphone (geophone) was developed for greater sensitivity. It was also here that the basic facts concerning use of microseismic activity to indicate rock failure became apparent. Rate of failure in place was measured by monitoring after a blast.

Another account from the same report shows effect of support: "Hole 23 —The record of this hole, as shown by the microseismic rate chart, was extremely active. This section of the tunnel was unsupported, and the first microseismic rate survey made in December, 1950, showed a rate of approximately 17 microseisms per minute. In January of 1951, the microseismic rate increased up to 42 per minute. Again, there was a decrease until May, 1951, when the microseismic rate became extremely high, over 120 microseisms per minute, which is approaching 3 per second, or 180 microseisms per minute, indicating a probable failure. This section was then partially pinned. The microseismic rate remained relatively high through October of 1951 and testing the roof with a steel bar did not produce a drummy sound. However, in December of 1951, the activity had lasted so long that the roof became very drummy. Shortly after this last test, a failure of the roof was noted within approximately 30 to 40 ft of Hole 23.

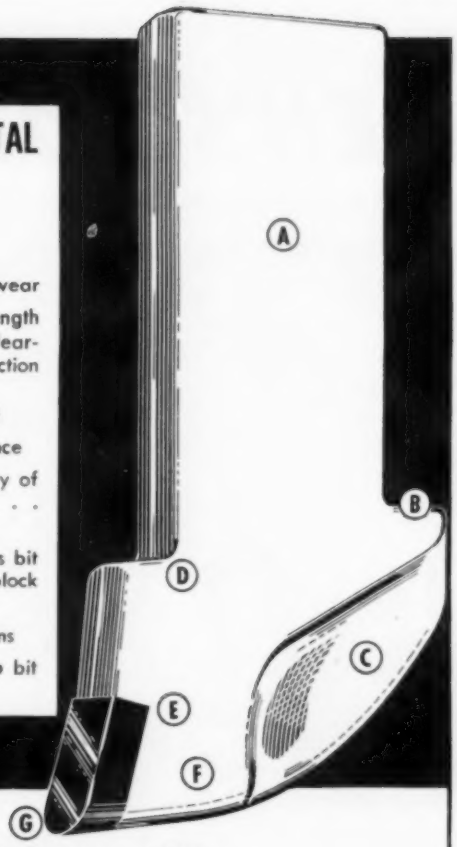
"After this failure occurred, the hole became inactive and in February and March, May and June, there was practically no activity. July showed an activity of approximately 18 microseisms per minute and again dropped off to zero.

"Before the assistance of the microseismic detection apparatus was available, the conclusion generally accepted was that a roof failure occurred very rapidly, but Hole 23 showed that in certain types of material, the activity may last a very long period of time, perhaps a matter of a half year or more, before failure occurs. This statement is not to be taken as a general one that all failures take such a long period of time. Experience has shown that some of the failures are relatively fast and may occur in a matter of hours."

Amplitude (loudness) of microseisms proved to be a means of locating activity which led to use of the attenuator on the amplifier. Characteristic sounds also were recognized as a means of aiding location.

New improved KENNAMETAL cutter bit design offers many features

- **G** Hard carbide tip for longer cutting wear
- **C** "I-Beam" construction adds strength while providing greater cutting clearance, especially for circular action cutters
- Thinner web . . . less steel to grind
- **E** Ideal top angle for cutting clearance
- **F** Good carbide support, with plenty of steel to back-up carbide tip . . . prevents breakage
- **B** Self-gaging shoulder . . . prevents bit from being forced back into the block and damaging chain
- **A** Shank styles to fit all popular chains
- **D** Knock-out shoulder . . . speeds up bit changes when needed



KENNAMETAL'S new cutter bit design provides:

- greater cutting efficiency at higher loads and speeds
- longer bit service
- fewer bit changes
- fast bit changes when required
- lower power consumption
- less machine downtime
- less machine maintenance
- lower percentage of extreme fines
- thus, higher production and reduced cost per ton of coal

All KENNAMETAL* Cutter Bits now of new, improved design . . . *rugged "I-Beam" construction*

Always a leader in cutter bit improvements that help bring out more coal faster, Kennametal has redesigned the complete line of Kennametal cutter bits. These improved cutter bits have now been in use in the mines for several months, undergoing most severe tests under almost every conceivable cutting condition . . . medium, hard and tough. They have been used in just about every cutting duty . . . on Joy, Jeffrey, Goodman, Compton, McCarthy Rotary and other machines. Results indicate the new design fills the need for even greater coal production capacity with fewer interruptions for bit sharpening or replacement. Thus, cost per ton of coal is reduced.

Have you tried these improved Kennametal Cutter Bits in your operations? If you have not, ask your Kennametal representative to show you these bits. Then test them in your mine. KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.

* Registered Trademark

There is a KENNAMETAL cutter bit for every cutting condition

Ask about complete line of KENNAMETAL cutter bits, drill bits, roof bits, augers, pinning rods, accessories

8419

INDUSTRY AND
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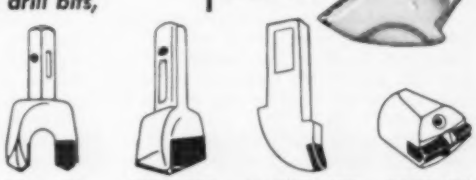

FOREMEN'S FORUM

1956: A brand new year to use as you will. It is yours to waste or yours to use in better service to your men, your company and yourself.

Point of Arrival, Point of Departure

DECEMBER 31 AND JANUARY 1 are two of the most significant days in the calendar. On the last day of the year the mood is one of reflection on successes and shortcomings and personal progress or lack of it in the preceding 12 mo. But precisely at midnight the reflective mood changes into one of anticipation. The change takes place in the twinkling of an eye, illustrating that every point of arrival is also a new point of departure. There is precious little time available for patting one's self on the back on having squeaked through the old year with minimum damage because the need for getting a good start in the new year is just too urgent to permit this self indulgence.

Following through on this theme, let's take a look at one 1955 development in mining and possible improvements that may be made in this area in 1956.

We've reached a point of arrival in the national campaign to prevent roof-fall injuries and fatalities. The passing of the first full year of the campaign brings a time for inventory. What do we see in the record?

Frankly, it's disappointing. The expected benefits have not materialized. In looking over the record we see that in the first 10 mo of 1955, falls of roof, face or rib caused 193 fatalities compared with 182 in the same period in 1954. These figures apply to both anthracite and bituminous mining. Total fatalities in the 10-mo period in 1955 are 350, against 319 in the same period the year before.

One out of every two fatalities is attributable to this single cause, and almost all these roof-fall accidents occur in the immediate face area.

Increased production and increased working time in 1955 do not provide a valid reason for the increase in the number of fatalities. The bitter truth of the matter is that while the rate of fatalities per million tons may be down slightly in 1955, the rate of fatalities per million man-hr of exposure is up. There is little solace for supervisors in that fact.

It is high time for every man in the mines to conduct a personal vendetta against the No. 1 Killer, falls of roof, face and rib, and supervisors should lead the campaign. We might be able to speak with pride of the new productivity records achieved in 1955, but the lack of progress in safety would take the shine off what we say.

On this point, the fat is in the fire. In a recent statement, the secretary of the Pennsylvania Dept. of Mines charged management with primary responsibility for the increase in fatalities in anthracite from this cause, although he did point out that hasty, careless workmanship also is a contributing factor.

What can be done?

Well, the road to improvement is plainly marked by guideposts, as follows:

1. Strictly adhere to established plans for roof support, either in bolting or in supporting with conventional timbers. The slightest lapse in applying the approved pattern may result in an accident.

2. Make it a point to notice workmanship in trimming loose coal and overhanging brows from ribs and face in every working place you visit. Speak up when you see evidence of sloppiness.

3. Insist on proper and timely use of safety jacks and posts.

4. Be on the lookout for kettle bottoms, bells and other inclusions that may slip out of the roof.

5. Remind the men at every possible

"...has hugged the idlers perfectly, right from the start of operations"

says Supt. of Freeman Mine No. 4 about U. S. Ustex-Nylon Slope Belt

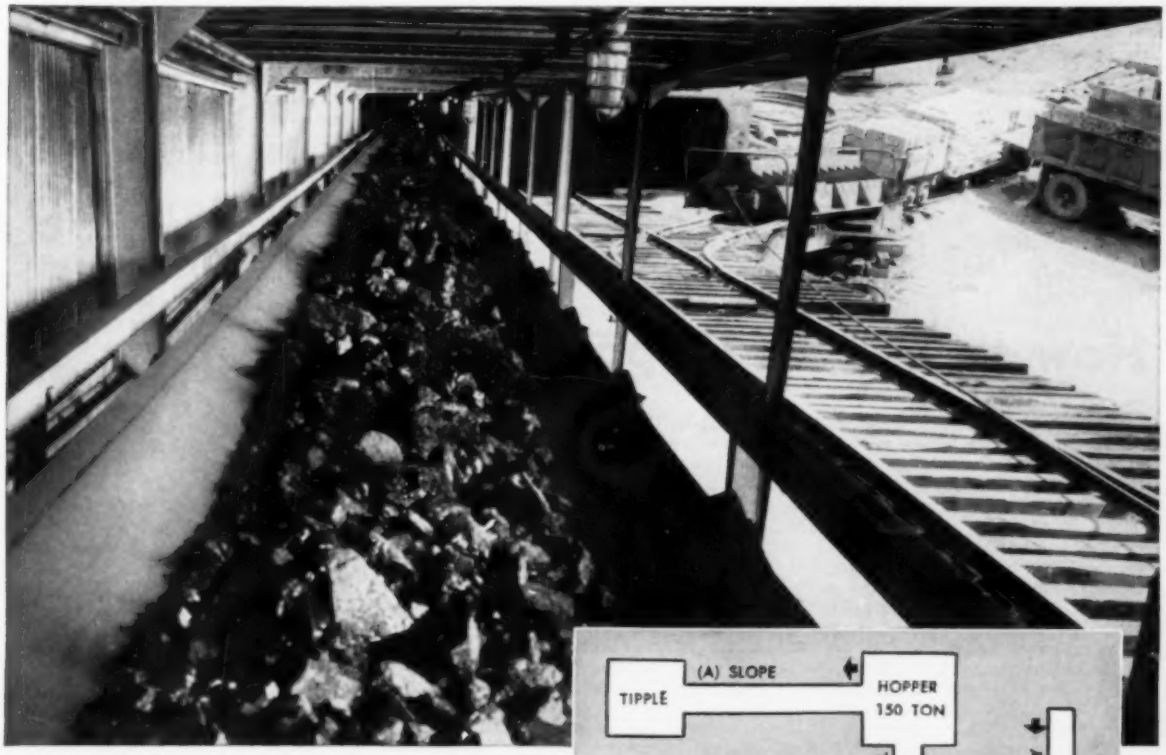

Photo shows U. S. Ustex-Nylon Mine Haul Slope Belt. Notice excellent troughability with perfect alignment.

Look at the facts: A 42" belt, 1,330 feet center to center.
Capacity: 400 tons per hour. Lift: 360 feet. Speed: 300 feet per minute.

"Idler-hugging" troughability, perfect alignment and training result from the quality "U.S." builds into its conveyor belts.

In this highly mechanized up-to-date mine, not only the slope belt but the underground gathering belts and the main haulage belt are all made by United States Rubber Company. The mine operator reports their performance is excellent in every way.

The belts supplied this mine are made of Ustex-Nylon and Cotton-Nylon, the two "U.S." patented developments which provide greater strength and flexibility. For steady, day-in and day-out dependability in conveyor belting, it will pay you to investigate the advantages of "U.S." Three-Way Engineering, in which "U.S." engineers work as a team with the mine engineers and the conveyor system engineers.

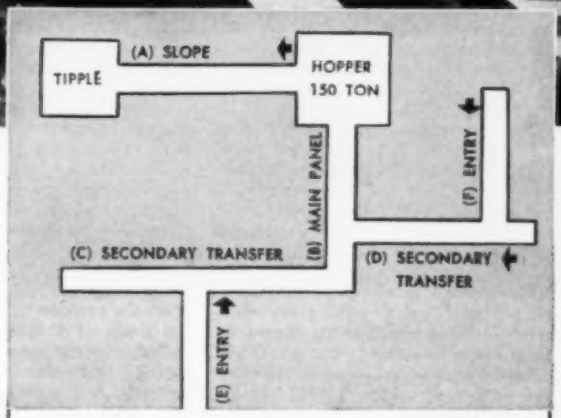

Diagram shows layout of Freeman Mine No. 4

(A) Slope Belt—42" Ustex Nylon Mine Haul.

(B) Main Panel Belt—42" Style XN U. S. GIANT Mine Haul.

(C&D) Secondary Transfer Belts—36" Style XN U. S. GIANT Mine Haul.

(E&F) Entry Belts—same construction as (C&D).

Contact any of our 27 District Sales Offices, or write to us at Rockefeller Center, New York 20, New York.

US RUBBER

Mechanical Goods Division

United States Rubber

opportunity you can to "watch the roof."

There are other approaches open to you.

Even though your company may be among the leaders in safety, your good record can be watered down when it becomes a part of industry-wide statistics. Every manager and supervisor working in the safer mines can help to convince the staffs at less interested mines that safety really pays. This may be done through the facilities of regional safety groups or operators' associations.

Intensive promotion of safety training among mineworkers is another avenue open to supervisors.

Finally, you may have to crack down on chronic offenders. Safety is a serious matter. You will be doing the careless or slipshod worker a big favor if you come down hard on this matter of roof support. After all, the life you save may be his.

You can start with sincere warnings that cannot be misconstrued. And you may have to follow through to the point of recommending discharge for the chronic offender if your warnings don't help.

In handling this matter of discipline, keep in mind the old Indian proverb: "You trick me once, shame on you. You trick me twice, shame on me."

The national campaign against the No. 1 Killer is a humane endeavor, worthy of the best efforts of capable supervisors. The irreducible minimum in mine safety has not yet been reached, and 1956 is the year in which to prove it. We stand at a new point of departure.

How to See an Opportunity

George Westinghouse . . . had a small shop a mile from the Schenectady station of the New York Central and used to see the trainmen respond to the "down-brakes" signal which the engineer blew on his whistle as he passed the Westinghouse shop. All the trainmen jumped to their positions on the car platforms and began to turn the handwheels that tightened up the brake mechanisms under the cars. The more he watched them the more convinced he became that it was a crude and ineffective waste of time and energy. It should not take a full mile to stop a train nor should it require the whole crew to do it. He saw as a challenge something that every trainman and every traveler had seen ever since the days of the first Camden and Amboy railroad and accepted as a necessary part of railway operation. To him it was something to be improved upon. He analyzed all the factors and decided that some mechanical device should replace the combined efforts of the crew, something more powerful and something the engineer could bring into play for the whole train at once. Something—but what? He pondered over many possible solutions using chains and cables, but all had insuperable objections.

Some months before this a neighbor's boy had induced him to subscribe to a magazine that had not yet begun publication. He had forgotten all about it when the first copy arrived. It happened to come while he was thinking over his problem. Sitting on his workbench eating his lunch at noon that day he heard the engineer whistle "down brakes." At the moment Westinghouse was reading an article in the new magazine about the great new source of power that was to replace steam for the driving of engines—compressed air. It was a fantastic dream, of course, but at that time many a wildcat stock promoter was selling stock in some compressed-air enterprise that was advertised as sure to pay fabulous dividends. Westinghouse was too good a mechanic to be deluded by the impossible projects, but he did see in compressed air the solution for the problem whose importance was just then being emphasized by the screech of the "down-brakes" signal. He had found the answer to his problem by reading in a magazine about an entirely different application.

There were no technical trade journals in those days; but a magazine article provided the missing clue for the solution of his problem, and he made the application to his own needs himself. He did not, however, attempt to sell the idea until many months of experimentation in his own shop had shown him it would work. And when it was tried under practical working conditions it was tried on a single train. The proof of its applicability was more spectacular than most foremen can hope for when they suggest new methods to their managements. Westinghouse and several New York Central directors and division heads were in the baggage car of the train as it sped toward the Schenectady stop when the engineer spied a balky horse in the shafts of a farmer's rig obstinately stalled directly across the tracks at the crossing near the Westinghouse shop. Instantly and automatically he sounded the "down-brakes" signal and then remembered the new air brakes which he immediately slammed on full force. The train stopped a few feet short of the balky horse, but the directors and division heads and Westinghouse were all piled up in a heap at the forward end of the baggage car. Even the scoffing Commodore Vanderbilt had to admit that "stopping a train with wind" was not so absurd a method as he had supposed it to be.

Westinghouse revolutionized railroad travel the world over by seeing as a problem what others had seen merely as an accepted practice, by fitting what he had read into the solution for which he was seeking, and by testing this solution to see that it was good.

From Do You Want to Be a Foreman? by Albert Walton. Copyright, 1941, McGraw-Hill Book Co., Inc.

Success Story

There was a time in Raymond M. Davis' life when, he says, "I drove the cows from their places that I might warm my bare feet where they had lain."

Today, Davis is head of one of the biggest coal-mining operations in the country and a leader in the fight for world peace.

The story of Davis' rise in the business world is told by former congressman Jennings Randolph in the December issue of *Success Unlimited*, published by Napoleon Hill Institute, Chicago.

Davis started out as a poor farm boy near Morgantown, W. Va., where he now makes his home. His formal schooling ended at 15 because he had to help support his family.

Through the years, he worked as an oil-field roustabout, a trolley conductor, a telegrapher, and a train dispatcher.

He carefully saved some of his meager salary until, in 1915, he took a gamble and leased 10 country coal mines. His operations were so small that he had to haul the coal to the railroad himself in a horsedrawn wagon.

A year later, however, he and a friend were able to open a new mine and start a full-scale operation. Things began going good for Davis—then the big depression struck.

"I lost every cent—including our home and furniture," Davis recalls. All he had left was $2.85 in cash and $150,000 in debts.

Davis' partner went into bankruptcy but Davis was convinced he could work himself out of the situation. He did. Within 6 wk he leased the Bunker mine near Morgantown and started again.

"For the next 3 yr," he says, "I had to forego the lunch habit as I didn't have enough money for that meal."

Within 7 yr, he paid off his debts and was able to buy the Bunker mine.

Since then his fortunes have risen steadily. The Bunker mine, with a reserve of 40 million tons, now has a daily capacity of 5,000 tons. As president of the Davis-Wilson Coal Co., Davis is still working a 48-hr week at the age of 74 and loving it. In 1944, he and his wife bought back the house they lost in 1930.

Through the years, Davis' interest in the cause of world peace has been translated constantly into active work for its behalf.

In 1942, Randolph introduced, on Davis' behalf, a measure suggesting that the president initiate steps for an international constitutional convention in the interest of peace. He also has campaigned for creation of a U. S. Department of Peace and has conducted essay contests in West Virginia high schools on the proposal.

Randolph concluded his article: "The life of R. M. Davis is a testimonial to the fact that it is not as important into what circumstances a man is born as to where and how he goes from there."

"That No. 8U can push a lot more material than any other blade I ever saw"

—Thomas L. Cinkovich, Superintendent,
Cripple Creek Coal Co.
Fairbanks, Alaska

Up in Suntrana, Alaska, this Caterpillar D8 Tractor with No. 8U Bulldozer works the year around in temperatures as low as 50 degrees below zero. It is removing 50 ft. of frozen gravel overburden to open up a 57-ft. vein of sub-bituminous coal for Cripple Creek Coal Co. of Fairbanks.

When it isn't handling 300 to 400 cu. yds. of overburden per day, the CAT* D8 Tractor with versatile No. 8U Bulldozer is building roads. "It's really a honey—does a good job in all kinds of weather," reports Superintendent Thomas L. Cinkovich. The No. 8U is ideal for handling heaping, long-haul loads—*bigger loads with less end spillage than any other 'dozer.*

The No. 8U likes its job tough and big. In addition to moving big tonnages of coal and overburden, it can really earn its keep at spoil bank leveling, chute loading, side hill work, cleanup around shovels, and many other jobs.

The Caterpillar No. 8U is now teamed with the new D8 Tractor for more power, more weight, more *work* than ever before. This new combination preserves traditional Caterpillar long work life and ease of handling. Your Caterpillar Dealer—who furnishes fast service and genuine factory parts—will prove that this high-output team can cut costs on *your* operation. Give him a call today.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

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NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE

OPERATING IDEAS

Mine-Tested Ideas Pay Off

These mine-developed kinks are typical results of management's emphasis on improving efficiency by putting ideas to work at Union Colliery Co.

Rope and Sheave Ease Sumping in Soft Bottom

SUMPING an off-track universal cutting machine when the bottom is wet and muddy no longer is a slow, aggravating job at New Kathleen mine. To provide uniform and rapid penetration of the coal under adverse conditions, a sumping drum and rope were added to a front wheel of the cutter. The hydraulic system was altered slightly to permit traction on one wheel to be cut out while the other one is used to act as a winch.

Here is how the device was made. First an 8-in-diameter drum with one solid side was made in the shop. Then eight ⅝-in holes were drilled in the solid side and additional holes were drilled in the cutter-wheel hub. Existing holes were drilled 1 in deeper. The drum next was securely bolted into position on the wheel and a piece of ½-in wire rope was placed on the drum. A loop was made in the free end of the rope and a hook was welded to each side of the front end of the cutter frame.

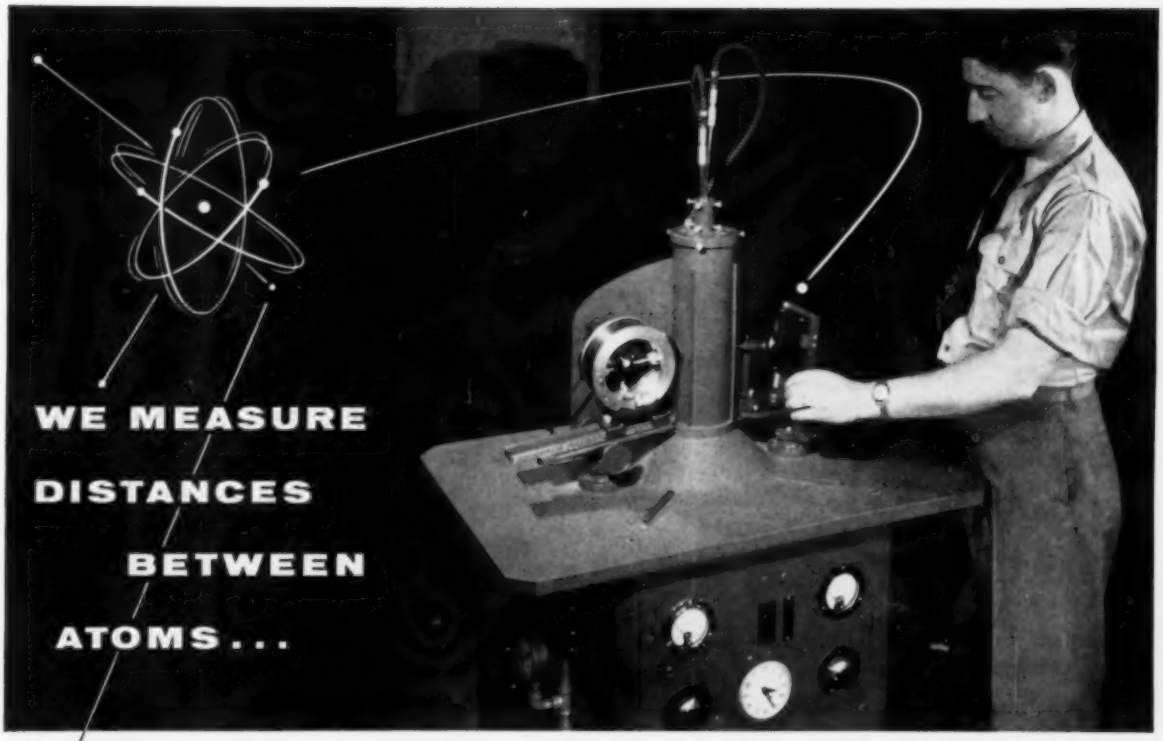
Several choke valves then were put into the hydraulic system so that traction could be stopped on the one wheel not fitted with the drum. This in effect made the left front wheel a sumping sheave that could be used to pull the machine ahead while it was sumping in a place with soft, slippery bottom.

A small sheave with a ring and a jackpipe complete the sumping device.

To use the device, the rope is unwound from the drum, placed around the sheave, and the loop on the free end is placed over one of the hooks on the machine frame. One end of the jackpipe is placed through the ring attached to the sheave and the other is placed against the roof. As the machine moves ahead, the jack is tightened and the rope is wound on the drum. Thus the machine moves forward regardless of the slippery or muddy bottom.

Old Loader Carries Duster

HIGH VOLUME ROCKDUSTING in an all-belt mine is no problem at Union Colliery, DuQuoin, Ill., since this crawler-mounted unit was built. When New Kathleen was converted from track to belt haulage, rockdusting was first done with a small rockduster hauled in a shuttle car. To permit faster distribution of rock dust, a large track-mounted MSA rock duster was converted to a crawler-mounted unit. Capable of traveling in all areas of the mine, the unit was made by adapting a Joy 5-BU loader frame and motor to carry and operate the rock duster.



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The X-Ray Diffraction Unit shown above is one of the few instruments of its kind being used in basic battery research. It identifies complex metallic compounds which cannot be identified practically by chemical means. It does this by actually indicating on film the distances between atoms, enabling Gould engineers to study atomic structure.

This instrument . . . this research . . . is revealing hitherto unknown facts about the relationship between molecular activity and battery performance . . . pointing the way toward more powerful, longer lasting active materials. That's why you get *better* batteries when you buy Gould!

For the full story on Gould Research, send for Booklet 749.

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Shuttle Car and
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Always Use Gould-National Automobile and Truck Batteries

Spacer Prevents Chain Rubbing

RUBBING between the tramming chain and chains on drive wheels on 42E shuttle cars has been eliminated at New Kathleen mine. A 1-in-thick spacer behind the wheel and smaller 9:00 tires in place of 10:00 units were combined to provide clearance for wheels fitted with chains. Before the spacer and smaller tires were added, there was not enough space between the tire and tramming chain. As a result, the tramming chain and the chain on the tire rubbed together. Addition of the chains to the wheels permits the cars to travel easier and faster in areas where water causes the soft bottom to be churned up into mud by the movement of equipment.

IDEA BOOSTER, Harry Williamson, superintendent, uses mine-developed gadgets to improve mining efficiency.

Winder Holds 600 Ft of Belt

THIS power winder comes in handy when a belt conveyor is being shortened or recovered. The unit is built on a steel frame and is readily towed around the mine by a locomotive. A 5-hp motor powers the chain that rotates the shaft used to wind the belt. Up to 600 ft of belt can be spooled at one time with the power winder. Belt may be hauled to a new setup and delivered to a storage area.

Scrap Roof Bolts Support Cables

SCRAP ROOF BOLTS are being put to work at Union Collieries' New Kathleen mine to support trailing cables at intersections. Old bolts that can't be reused are cut off about 12 in from the end and bent into a J shape. Short holes are drilled into the mine roof at heading intersection or at break-throughs. Regular roof-bolt expansion shells are placed on the J-shaped hooks which are then inserted in the holes and tightened. Bolts are recovered as mining advances.

Rod Detects Torn Belt

DETECTING a major tear in a conveyor belt before it has a chance to become worse is done by means of a rod device extending in front of a pulley. Installed at one of the drive pulleys on the head end of the conveyor, the mechanism is designed to stop the belt when a loose or torn piece of belt comes over the top of the pulley and is thrown outward by centrifugal force. As the extended torn section moves downward it strikes a rod that is 2 in away from the pulley and extends its full width. When the rod is struck by the torn piece of belt it is knocked down and a switch to which it is attached is opened. This stops the belt and it cannot be restarted until the switch is reclosed and the rod is replaced in the up position. A thorough examination of the belt is made and the damage repaired before the belt is restarted.

"Our TD-14A DROTT rips out

CONCRETE SLAB and FOOTINGS

a ¾-yard power shovel couldn't touch"

—Pangia Construction Company, Atco, New Jersey

Smack 8-inch-thick slab, or 5-foot-deep footings, of pipe-laced concrete with the 17,000-pound break-out force of an International Drott TD-14A. And something's got to give!

The pictures tell you what gives as this TD-14A Skid-Shovel, owned by Pangia Construction Company, Atco, New Jersey, slams through a 150-cubic yard concrete excavation job—for a new Sinclair station in Camden.

"We are ripping out concrete slab and footings that a ¾-yard power shovel couldn't touch," reports Owner Albert J. Pangia. "The operation is fast because of the breakout action. We use our TD-14A Drott Skid-Shovel for everything."

● Why not size-up these big advantages that give you new loader job range, yardage capacity, and profit opportunities? See your International Drott distributor for a Skid-Shovel or Four-In-One demonstration!

No other loader has it!

Apply the scientific lever principle of *exclusive and patented pry-over-shoe break-out, plus ground-level bucket roll-back.* And an International Drott Skid-Shovel gives you up to three times as much concrete-smashing, frost-breaking, boulder-bucking break-out force as other front-end loaders can deliver. *No other loader even has skid-shoes!*

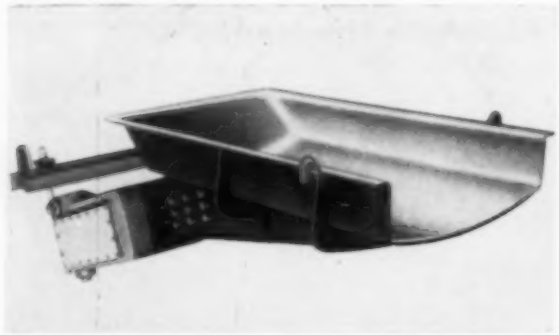
This great hydraulic pry-out power over big skid-shoes shunts stresses directly into the ground, too —so they can't maul bucket or tractor.

And only an International Drott has the shock-swallowing protection of patented Hydro-Spring—that reduces the effects of carrying, dumping, or other impact forces to *operator* and *tractor* by 67 per cent, or more—increases equipment life by a reported 25 per cent. *Hydro-Spring also eliminates most hydraulic hose failures!*

INTERNATIONAL HARVESTER

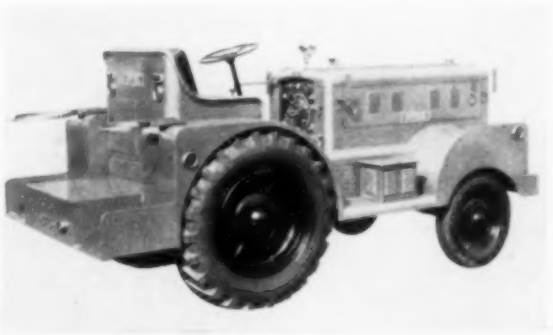
INTERNATIONAL® DROTT

EQUIPMENT NEWS



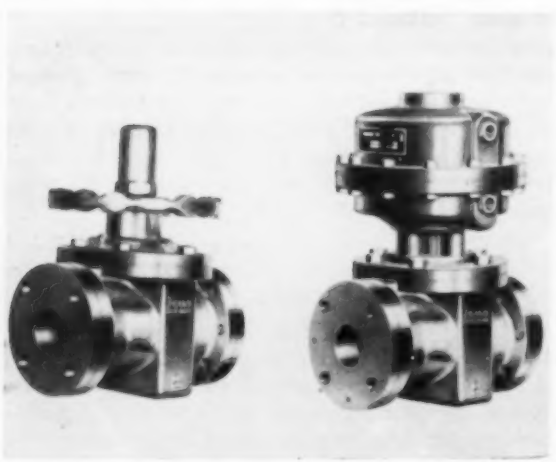
Dust-Protect Feeder Magnet, Springs

An optional feature designed for protection against dusty atmospheres is being offered with the F-55DT vibratory feeder manufactured by Syntron Co., 975 Lexington Ave., Homer City, Pa. By enclosing the feeder's magnet and leaf springs, the company says that dust in the air, or spillage from a supply hopper, is kept away from the feeding action of the "electromagnetic motor" drive. The leaf spring ends are covered on each side of the base casting and a metal plate covers the armature and core. Equipped with a 48x60-in flat pan trough, the F-55DT "Heavy Duty Vibra Flow" feeder's maximum capacity is 500 tph. The dust plates are bolted to the magnet casting.



Mobile Unit For Scattered Weld Jobs

A newly designed "Weldmobile" has been announced by Hobart Bros. Co., Troy, Ohio. Self-contained, self-propelled and equipped with a generator coupled directly to its engine, the unit was designed, says its maker, for welding applications that occur at widely separated areas. The 400-amp model is powered by a Chrysler 6-cylinder industrial engine, the 600-amp model by a Chrysler V8-cylinder engine. The unit can also supply up to 1 kw (110-v, DC) auxiliary power. Larger wheels and "Ground Gripper" tires have been mounted in the rear, implement-type tires in front. Ground clearance has been increased, according to the manufacturer.



Self-Aligning Drive Tightens Valve

A sealed, metal-enclosed, flexible valve (pressure to 250 psi) has been developed by Farris Flexible Valve Corp., 586 Commercial Ave., Palisades Park, N. J. Traded as "Superseal," the valve uses a self-aligning drive to pinch off the sleeve body for tightness. It can be fitted with a diaphragm motor for instrument-operated control of throttling and is equipped with a connection to pressurize the space between its flexible body and cast housing. Two types, "Standard" diaphragm motor designs and "Extra-Power," are available.

Frameless Dump Adds Ton To Payload

A frameless dump trailer, "Teleramic," is being made by the Anthony Co., Streator, Ill. When dumping, the entire front end of the trailer is lifted by a hydraulic, telescopic cylinder mounted on the tractor's fifth wheel coupling. In raising or lowering, the trailer body pivots around the rear wheels as tubular stabilizing arms, pinned to the hoist fifth wheel and the trailer body, give added support. The maker says that greater legal payloads (2,000 lb) can be hauled because the frame has been eliminated and only one lifting cylinder used.

CP hydraulic Coal Drill... Drills a 9 foot hole every 30 seconds in Hard Seams

They don't come any better than this CP-35-HCD Hydraulic Coal Drill:

REALLY SAFE. Provides absolute protection from electrical hazards . . . no sparks or shocks.

EASY TO HANDLE. There's no kick on stall. Its 35 pound weight and simple design make it a cinch for one man to operate.

PERFECT CONTROL. Its high torque motor and fast-acting throttle deliver that bonus power and quick response so important in hard seam drilling.

OPERATES FROM POWER SYSTEM of cutting, timbering or roof bolting machines.

MOTOR SPEED minimizes vibration and makes long lengths of auger easy to hold.

A complete line of accessory equipment . . . valves, gauges, junction blocks, hoses, and fittings is available. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

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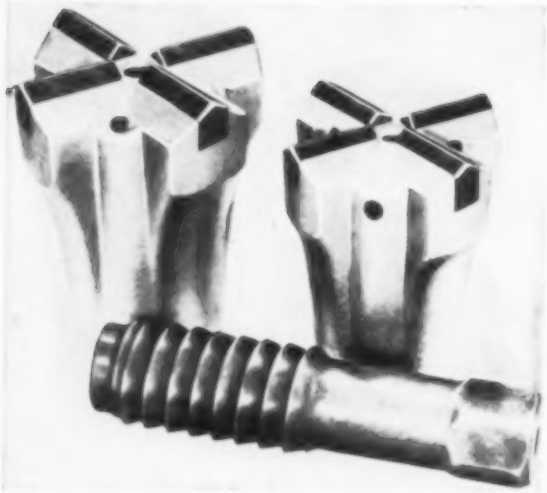
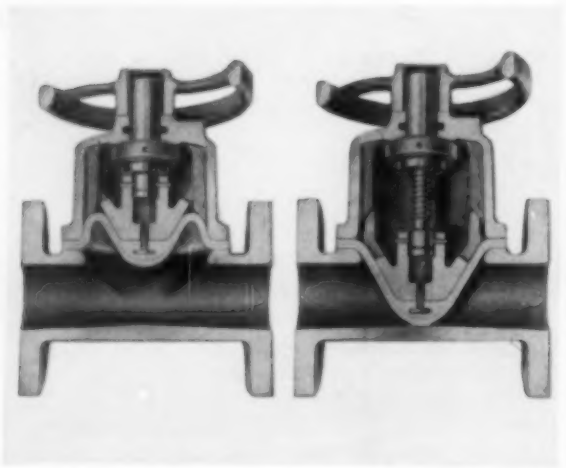


Bit Rifling Problem Eliminated

The addition of a "600-thread series" to the carbide-insert "Rok-Bit" line has been announced by Brunner & Lay, Inc., 9300 King St., Franklin Park, Ill. The 3½-, 3-, 2¾- and 2½-in "X" design bits eliminate the rifling problem, according to the manufacturer. Where ground conditions are suitable, 2¾-in and 3-in 600 series "Rok-Bits" are offered in cross design. These particular bits fit directly on the G-D extension rods with no need for adapters. Each bit has five air holes (center hole, two on the cutting face and two on the sides) to facilitate chip removal and keep the bit from working in its own cuttings, according to Brunner & Lay.

11 Models Offered In New Truck Line

An 11-model line of Mack trucks, the B-80, is being produced by the company at its Allentown, Pa., plant. Buyers have a choice of gasoline or diesel engines ranging from 170 to 300 hp, including the 205-hp "Thermodyne" turbocharged diesel. Choices in transmissions, from the 5- to the 20-speed "Quadruplex," can also be made. The B-80's 6-wheel model is equipped with an inter-axle differential designed to deliver torque to each axle in proportion to traction. Mack says this will eliminate slipping. The 4-wheel model's GWV is 46,000 lb. The 6-wheelers are rated at 55,000 and 65,000 lb. Frames are double-channeled.



Unblocked Flow Feature of Valve

The Grinnell-Saunders "Straightway" diaphragm valve offers a "straight-through" flow of viscous materials, fibrous slurries, semi-fluids and solids in suspension, according to the manufacturer, Grinnell Co., Inc., 260 W. Exchange St., Providence, R. I. The manufacturer also cites these five points: (1) minimum pressure drop. (2) rodding or brushing without removing the valve bonnet and without damage to the body linings, (3) self-drainage when a pipe line is pitched sufficiently to drain piping, (4) positive closing, even when handling gritty, fibrous material, (5) isolation of the bonnet from stream.

Hoist Shifted For Load Distribution

A series of single- and tandem-axle trailer dumps and 4-wheel trailers (capacities up to 30 cu yd) has been announced by Hercules Steel Products Co., Galion, Ohio. Equipped with front-mounted, single-cylinder, telescopic hoists, the units were designed to be hauled by either single- or tandem-axle tractors. Hercules has front-mounted the hoist, shifting its weight to the tractor axles to improve tractor-trailer load distribution. Lifting capacities up to 35 tons are provided by a single 5-sleeve, 8-in telescopic hoist. A 4-sleeve, 7-in hoist gives similar capacities on 17-ft single-axle dumps and full trailers.

B.F.Goodrich

Tires carry 40 tons of coal over 25,000 miles of rocks—ready for more

ONE of the world's largest strip mines is operated by the United Electric Coal Companies at DuQuoin, Illinois. Here fleets of trucks carry 40-ton loads of coal from rock-strewn pits over long haul roads made of abrasive slate. Tires could be chewed to pieces quickly, running up huge maintenance costs, running down production.

United avoids these problems with B. F. Goodrich tires, reports they have averaged 25,000 miles already with less than half their service life gone!

All-Nylon cord body

Universal tires can take this kind of punishment because they're now built with an *all-nylon* cord body (size 12.00 and larger, smaller sizes in rayon or nylon). Nylon is stronger than ordinary cord materials, can withstand double the impact and resist flex breaks.

Under the tread is the patented B. F. Goodrich nylon shock shield. Layers of strong nylon cords stretch together to absorb shocks and protect the tire body. Universal tires wear longer; more tires can be recapped. You pay nothing extra for this nylon shock shield.

See your B. F. Goodrich representative today and find out how you can get longer tire service at lower cost in your mine work. The address is listed under Tires in the Yellow Pages of your phone book. Or write *The B. F. Goodrich Company, Tire & Equipment Division, Akron 18, Ohio.*

Specify B. F. Goodrich tires when ordering new equipment

UNIVERSAL TREAD resists rock cuts and bruises. Wedge-shaped cleats defy slippage, pull in either direction.

OVER-ALL VIEW of the giant DuQuoin mine. It's one of 6 operated by United in Illinois and Kentucky.

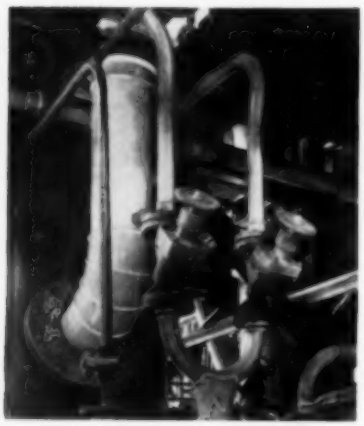
RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Dump Trailer's Capacity Is 15.6 Cu Yd

Athey Products Corp., Chicago, Ill., is marketing the "Athey PR 15-Cat DW 15" rear-dump trailer. The trailer has a capacity of 15.6 cu yd, speeds up to 31.3 mph, right or left angle turns of 90 deg and 3-stage hydraulic hoists that tilt the body 60 deg for materials ejection. The entire loaded unit weighs 84,683 lb, with 37% of the load resting on drive wheels of the "Cat" 186-hp tractor. The dump body is an all-welded single unit. High-tensile steel side plates are ⅜ in thick. The bottom is constructed of ½ in steel over 1¾-in solid oak plank filler over 5/16-in lower plate. Box sections reinforce the body. High speed, large capacity pump, flow control valve and double-acting jacks have been teamed for hydraulic control. Dumping can be accomplished on the go. The dump's discharge lip extends beyond the rear wheels to cast loads over the edge of fill.

Quick Chain Repairs Seen

A chain repair link labeled the "Twin-Pin" has been designed by Page Engineering Co. to provide fast repairs. The company says the link can be quickly installed using only a hammer. Chain repairs can be made within five minutes on the job, according to Page. The unit also can be used to join a load line to a hitch plate extension and, with large drag-line buckets, as a connection to the trunnion link. Page Engineering Co., Clearing PO, Chicago 38, Ill.



Firm to Sell Plastic Pipe

Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill., has begun manufacturing plastic pipe to be sold under the trade name "Ryertex-Omicron PVC" (polyvinyl chloride). Rigid and non-plasticized, the pipe is said to be suitable as a structural material. Rigid polyvinyl chloride plastics are relatively new in this country although they have been successfully used in Europe for some 20 yr. The type to be marketed by Ryerson has no additives or fillers, which, the company says, insures maximum resistance to attack by acids, alkalis, salt solutions, alcohols, and other chemicals. The company says the pipe is not combustible. It can be sawed, threaded, solvent welded and heat welded. Ryerson will supply Schedule 40 and Schedule 80 pipe sizes.

More Torque, Less Heat

New type clutches have been developed by the Rockford Clutch Div., Borg-Warner Corp., specifically for heavy-duty clutch service, the company says. The new clutches are offered under the trademark "Morlife." They are best adapted for heavy-duty machines, such as tractors, trucks, cranes, shovels, bulldozers, tanks, earth movers and graders, according to Borg-Warner. The company claims 100% more capacity and an increase of as high as 400% in the work life of "Morlife" clutches. Heat dissipation has been lessened to the extent that excessively burned and warped clutch plates have been eliminated, the company says. The clutches are recommended only when specifically engineered into the machines in which they are to serve. 1301—18th Ave., Rockford, Ill.

Split Flange Hose Fittings

A complete line of split-flange-type hose fittings has been announced by Aeroquip Corp., 300 South East Ave., Jackson, Mich. Available in straight, 45- and 90-deg assemblies, the steel fittings are designed for use with the company's single- and double-wire braid hose. The four-bolt split flange features ease of positioning in installations and rapid disassembly, the company says. The fittings conform with all SAE specifications and are available in all sizes from ½ in to 2 in.

Gate Valve Redesigned

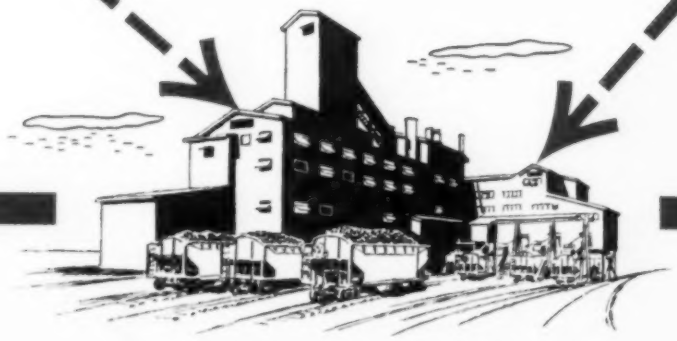
Crane Co., 836 S. Michigan Ave., Chicago 5, Ill., has redesigned its No. 430, 125-lb brass, rising-stem, double-wedge, disk gate valve. The valve, recommended for general service on steam, water, oil and gas lines, is manufactured in sizes from ¼ to 3 in. The body neck is cylindrical and has been designed to eliminate the need for massive wall sections, according to the manufacturer. Crane says further that the cylindrical shape reinforces the seat area against the wedging of the disc and safeguards against distortion of the body in seating the disc. Valves ¾ in and larger contain a stuffing box gland, while sizes ½ in and smaller do not.

Hose Fitting Separate Unit

Aeroquip Corp., Jackson, Mich., has introduced "666" hose, featuring a tetrafluoroethylene ("Teflon") inner tube and a detachable, reusable fitting. The characteristics of the hose assembly include, says the company, an ability to withstand extreme temperatures, from 100 deg to 500 deg. It is also impervious to acids and many other fluids usually not transportable by synthetic or natural rubber hose. The reusable fitting can be attached and detached by hand without the use of

FAIRMONT

The Mark of Service !



● This FAIRMONT symbol of service on the side of a modern coal preparation plant shows that here the job of cleaning and preparing coal is being done better.

● It means that the customers of this FAIRMONT-Built plant are enjoying a more uniform product with its resulting increased efficiency and reduced costs.

● Preparation Plants displaying the FAIRMONT Service Mark, are the advanced product of 60 years of successful engineering and erection by Fairmont Machinery Company . . . a Company which provides a wide choice of quality equipment, as well as the qualified talent necessary to carry through a job from the drawing board to the finished and operating plant.

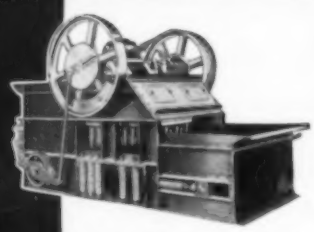
When you plan to modernize an old or build a new coal preparation plant include the FAIRMONT Mark of Service in your planning.

FAIRMONT
MACHINERY COMPANY
FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

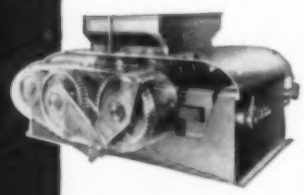
America's most complete line of CRUSHING EQUIPMENT

AVAILABLE
FROM STOCK
AND ON SHORT DELIVERY



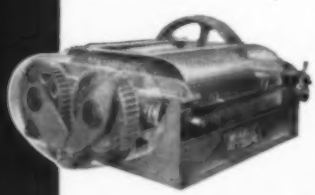
McNally Norton Vertical Pick Breaker

50% less fines when reducing lump to egg and stove sizes.



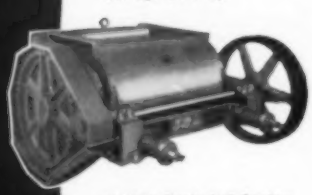
McNally Double Roll Gearmatic R. O. M. Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating Gearmatic drive.



McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages:
High volume production, plus accurate sizing, plus low percentage of fines.



McNally Single Roll Crusher

Universal application. 20", 24" and 36" dia. rolls.

For immediate action on complete information write, wire or call . . .

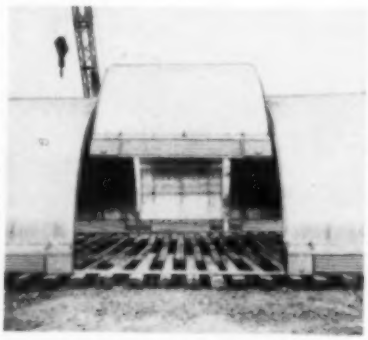
Mc

★ Pittsburg, Kansas ★
★ Wellston, Ohio ★

special tools. The company says that tetrafluoroethylene tubing "appears to be ageless" since the material "is practically inert, chemically."

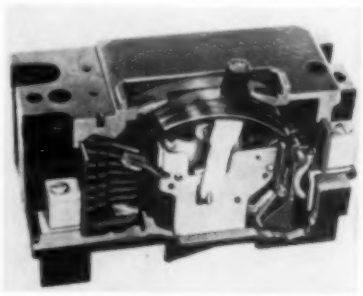
500-W Lamp, 115,000 Cp

A floodlight that produces 115,000 cp with a 500-w rating has been announced by Stonco Electric Products Co., Kenilworth, N. J. The unit concentrates its entire light output in an oval-shaped, high-intensity beam designed to be effective in long range floodlighting. Constructed of cast aluminum the lamp's life is said to be 2,000 hr.



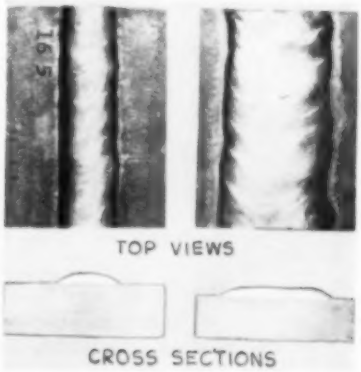
Expand Portable Shed Line

Yard-Stor Shelter Co., 19256 John R., Detroit 3, Mich., has announced a new line of portable sectional metal storage shelters. At the same time the company announced it had devised a rental plan for emergency and temporary uses to be offered through local crane and fork-truck rental services. The company is now offering its basic design in six arrangements. The "Crane-Stor" is arranged primarily for handling materials by crane. The "Slide-Away-Stor" is arranged primarily for sliding apart or tilting for access by fork truck, straddle truck, dump truck, and tractor loader. The "Roll-Away-Stor" is arranged with swivel casters for pushing the section over very heavy objects. The "Sta-Stor," a stationary type, features fully assembled quick delivery for emergency needs such as field offices. The "Open-Top-Roof" is for new and existing buildings for heavy equipment replacement or rearrangement by mobile crane. The "Open-Air-Conditioner" is for installation on concrete slab for masonry walls and features motorized push button control to create an open air conditioner in favorable weather. Details about the building rental plan from the company.



Circuit Breaker Smaller

The use of "Gibsiloy" silver-tungsten electrical contacts in a new I-T-E "E" frame circuit breaker helps the advance toward high ratings for small breakers, according to Gibson Electric Co., 8368 Frankstown Ave., Pittsburgh 21, Pa. The "E" frame design now provides ratings up to 100 amp at 250 v AC in a breaker more compact than before, the company says. It adds that the resulting space saving means a smaller overall size for 100-amp, 250-v panelboards.



Metal Weld Speedy, Sound

The McKay Co., 1005 Liberty Ave., Pittsburgh, Pa., is marketing the first of a series of iron-powder, low-hydrogen, hard-surfacing electrodes. The "McKay Hardalloy 48" electrode combines the speed of contact-type electrodes with the weld metal soundness and crack resistance of low-hydrogen weld deposits, the company says. Weld metal deposited by the electrodes is highly alloyed high-chromium-iron type and has a hardness in excess of 55 RC as it is deposited. The maker says that the electrodes deposit weld metal as much as 50% faster than conventional-type hard-surfacing electrodes and that problems normally associated with base-metal dilution are virtually eliminated. The hardness of the

first layer of overlay material is essentially the same as that of the third or fourth layer, the company says.

Lamp Lights 5,000 Sq Ft

American Optical Co. says it is marketing Model 100X "Sentry-Lite" with a battery that requires water once a year. The 100X is a single-lamp model that lights an area of 5,000 sq ft. A double-lamp model (photo) is available under catalog number 200X. It lights a 10,000 sq ft area. The 100X and 200X "Sentry-Lites" are said to be instant and automatic when power failure occurs during an emergency. American Optical Co., Safety Div., Southbridge, Mass.

Explosion Guard Built In

A new industrial "Eveready" flashlight, said to prevent a broken bulb from touching off explosive gas mixtures, is being manufactured by the National Carbon Co., Div. of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y. The safety features of the flashlight are based on a triggered reflector unit molded of bakelite phenolic plastic that acts as a circuit breaker. The flashlight has been approved by the USBM for use in methane and air mixtures and has been listed by Underwriters' Laboratories, Inc., for use in gas-air mixtures of Class 1, Groups C and D. These mixtures include natural gas.

Equipment Shorts

ALUMINUM WELDING CABLE—General Cable Co., 420 Lexington Ave., New York, N. Y., has announced it is marketing a light-weight aluminum welding cable, Type D866. The cable is said to have an "excellent degree of flexibility" and has been constructed to prevent kinking. The combined insulation and jacket of vulcanized rubber assures resistance to abrasion, impact, flexing and twisting, the company says. The cable not only provides safety and long service life, but also considerably reduces operator fatigue, according to the manufacturer.

LUBRICANT—The Tower Oil Co., 300 W. Washington St., Chicago 6, Ill., has announced a lubricant called "Molyfilm." It is said to be highly efficient for break-in running, wire drawing, tools, dies, threaded parts and other difficult-to-lubricate areas. The company also claims that "Molyfilmed" surfaces resist galling, seizing, abrasion and very high pressures. The lubricant is concentrated molybdenum disulfide. It can be used either as a lubricant itself or as a lubrication prime coating.

PORTABLE OIL FILLER—A portable hand pump for refilling all types of oil cups and reservoirs directly from a gallon or larger container through a light flexible hose is being marketed by the Trico Fuse Co., 2948 N. 5th St., Milwaukee, Wis. Because the pump's suction hose can be tapped directly to an oil container the need for transferring oil from one container to another is eliminated. The large reserve oil supply also eliminates constant stoppages to refill small oil cans.

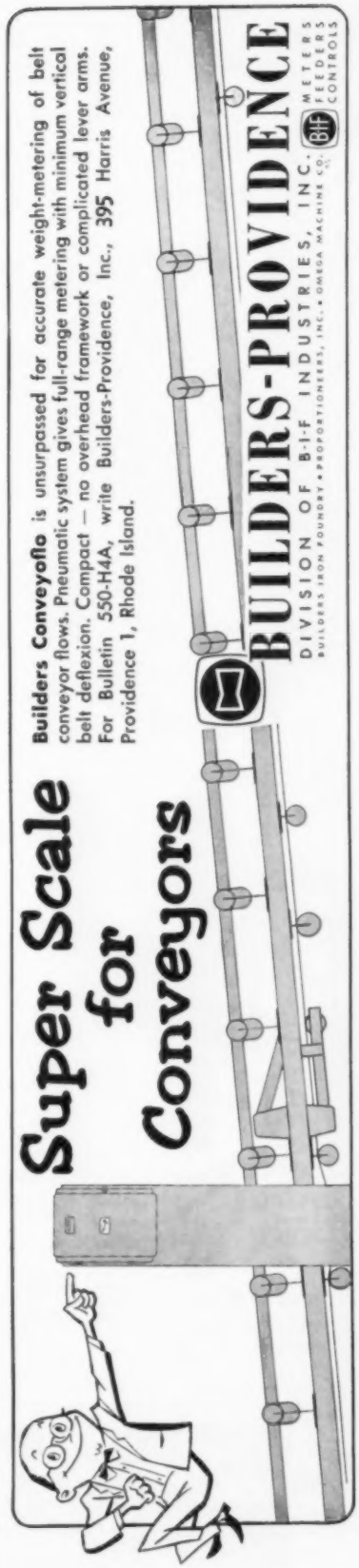
Free Bulletins

ARC WELDING TUBE RODS—A bulletin describing several recently developed arc-welding alloys is being distributed by Coast Metals Inc., Little Ferry, N. J. Materials listed in the bulletin consist of alloy-filled tubes either in coils for automatic welding, or cut to length for manual application. The alloys and methods of manufacturing were developed, says the company, during 2 yr of research and field testing. The hard-surfacing tube rods, according to Coast Metals, give smooth deposits and long service life.

CAST IRON — Specifications for six classes of metallurgically controlled irons are itemized in a bulletin titled "Precision Cast Irons." Both mechanical properties and tested applications have been printed in check list form. The "SorboMat" metallurgical system is used. McNally Pittsburg Foundries, Inc., Pittsburg, Kansas.

GEAR-TYPE COUPLINGS — American Flexible Coupling Co. is distributing a booklet, "Amerigear Couplings . . . In Action," that contains case histories of power transmission problems reportedly solved by the company's coupling. The booklet describes the advantages said to come from using conventional gear-type couplings plus crowned flank, crowned tip and chamfered tip. 1801 Pittsburgh Ave., Erie 1, Pa.

GENERAL EQUIPMENT — The New York Air Brake Co., 230 Park Ave., N. Y., is distributing Brochure 1102 illustrating


Super Scale for Conveyors
Builders Conveyoflo is unsurpassed for accurate weight-metering of belt conveyor flows. Pneumatic system gives full-range metering with minimum vertical belt deflexion. Compact — no overhead framework or complicated lever arms. For Bulletin 550-H4A, write Builders-Providence, Inc., 395 Harris Avenue, Providence 1, Rhode Island.
BUILDERS-PROVIDENCE
DIVISION OF B-I-F INDUSTRIES, INC.
METERS
FEEDERS
CONTROLS

We did it this way to give you a bigger and better look at this new mine vehicle that's boosting production! - slashing costs! - making history!

The self-propelled

Lee-Norse

MINE PORTAL BUS

with the exclusive split-roof!

The answer to speeded up transportation for your section production crews is here at last! It's the new self-propelled Lee-Norse MINE PORTAL BUS with the split-roof.

Yes, for the first time a vehicle that actually holds portal to portal time to a minimum—boosting tonnage!—lowering costs!—saving money!

Here's why the Lee-Norse MINE PORTAL BUS leads—

- "Tailor-made" for your seam—your condition!
- Capacity varies from 14 to 20 men depending on available clearances in mine!
- Two independent braking systems for complete safety—disc brakes (airplane type) are smoothly operated by either hydraulic or mechanical means.
- Unique split-roof gives the driver unhampered sweep vision in all directions at all times—trolley pole is always within his easy and safe reach.
- Designed and built by the originators of the well-known Lee Norse JITNEY and the famous Lee-Norse MINER.

Let us show you how this BUS CAN PAY ITS WAY - write or call

Lee-Norse Company

Specialists in Coal Mining Equipment

CHARLEROI, PA.

and describing products from the company's line of vacuum and liquid pumps, air-brake equipment and hydraulic motors, controls and pumps. The booklet was printed as a guide to equipment produced by Air Brake's five manufacturing divisions: Aurora Pump Div., Dudco Div., Hydreco Div., Kinney Mfg. Div. and the Watertown Div.

MOTOR GRADER — The engineering, design and performance features of the Allis-Chalmers heavy-duty "Forty-Five" motor grader are described in catalog MS-446 available from the Allis-Chalmers Mfg. Co., Tractor Group, Construction Machinery Div., Milwaukee, Wis. Developments incorporated in the "Forty-Five" and in its 120-hp diesel are given in detail. Safety and comfort designs are also outlined.

CRAWLER TRACTOR — Engineering, design and performance features of the HD-21 diesel-powered crawler tractor are described in catalog MS-457 available from the Allis-Chalmers Mfg. Co., Tractor Group, Construction Machinery Div., Milwaukee, Wis. The catalog also describes the model's 204 net engine hp diesel. Matched equipment and accessories are listed.

THICKENERS — Hardinge Co., Inc., York, Pa., has printed bulletin 31-E describing its line of thickeners, clarifiers and agitators. The catalog describes applications and shows construction details for "Auto-Raise" thickeners, circular and rectangular type clarifiers, agitators and related equipment. A formula is provided for determining tank diameters of thickeners for any given set of data.

WIRE ROPE SLINGS — "Dura-grip" wire-rope slings are featured in a bulletin prepared by the Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., 575 Madison Ave., New York, N. Y. A special splice construction utilizes the full strength of the rope from which the slings are made, according to the bulletin. "Dura-grip" sling advantages, says the company, are a hand splice and a smooth steel sleeve. The bulletin illustrates various assemblies for which the slings can be used and lists dimensions and rated capacities.

INDUSTRIAL ENGINES — A bulletin describing industrial engine models H540 and H844 V-8 has been printed by the Le Roi Div., Westinghouse Air Brake Co., Milwaukee, Wis. The bulletin uses charts, drawings and diagrams to illustrate designs and performances. The two engines operate on gasoline, natural gas and LP gas. The H540 is rated at 190 hp, the H844 at 285 hp. Both engines are described as modern, short-stroke designs. Also described are a 5-bearing crankshaft, overhead valves, wet cylinder sleeves, slanting-valve combustion chambers, water-cooled exhaust manifolds, gear-driven water pumps, full-flow oil filters and pressure lubrication.

STAIR REPAIR—"Making Stairs and Walkways Safe" is the title of a brochure being distributed by Wooster Products Inc., 100 Spruce St., Wooster, Ohio. The folder describes how to repair stair

18-TON TRUCKS are loaded at the rate of 10 cu. yds. per minute by Athey 125 HiLoader. Highest daily production is 2000 cu. yds. for a 7¼-hour working day.

WORKING ALL THE TIME, Athey 125 HiLoader trims and realigns stockpiles while waiting for trucks. Hydraulically controlled from cab, discharge conveyor swings 55° to either side, eliminates excessive truck spotting.

GETS 200% MORE PRODUCTION

By Switching to Athey 125 HiLoader

Two thousand cu. yds. of stoker coal for a 7¼-hour working day! That's the highest daily production of this Athey 125 HiLoader working at Seminole Coal Corporation, Lenzburg, Ill. W. H. Price, Superintendent, says, "Our former method gave us one-third the loading production of this Athey HiLoader. We are very pleased with results." That's a 200% increase in loading production with the Athey 125 HiLoader. And here are some of the reasons why it's such a big producer:

1) Swiveling discharge conveyor has a 13′ 5″ clearance, dumps over truck cab or high tail gate. Trucks just pull alongside of HiLoader. Operator spots conveyor over truck body to start loading quickly.

2) Two-speed rear axle gives loading speeds down to 0.30 MPH, traveling speeds up to 20 MPH. 23′-non-stop turns enable the machine to "get around" in tight places — reduce waste time and effort.

3) Exclusive, patented full-floating feeder floats on coiled springs, prevents build-up or jamming; material is carried onto belt at a constant high rate.

4) Hydraulic controls within easy reach and unobstructed visibility of ground, feeder, belt and discharge conveyor.

5) Big industrial engine supplies power for traveling as well as for operation of feeder and belt.

There are many more outstanding and production-designed features in the Athey 125 HiLoader . . . features that add up to 10 cu. yds. per minute loading at an estimated cost of less than one cent a yard. Take advantage of this remarkable machine — get more production at less cost!

See your Athey-Caterpillar Dealer; he'll show you how it's done.

ATHEY PRODUCTS CORPORATION

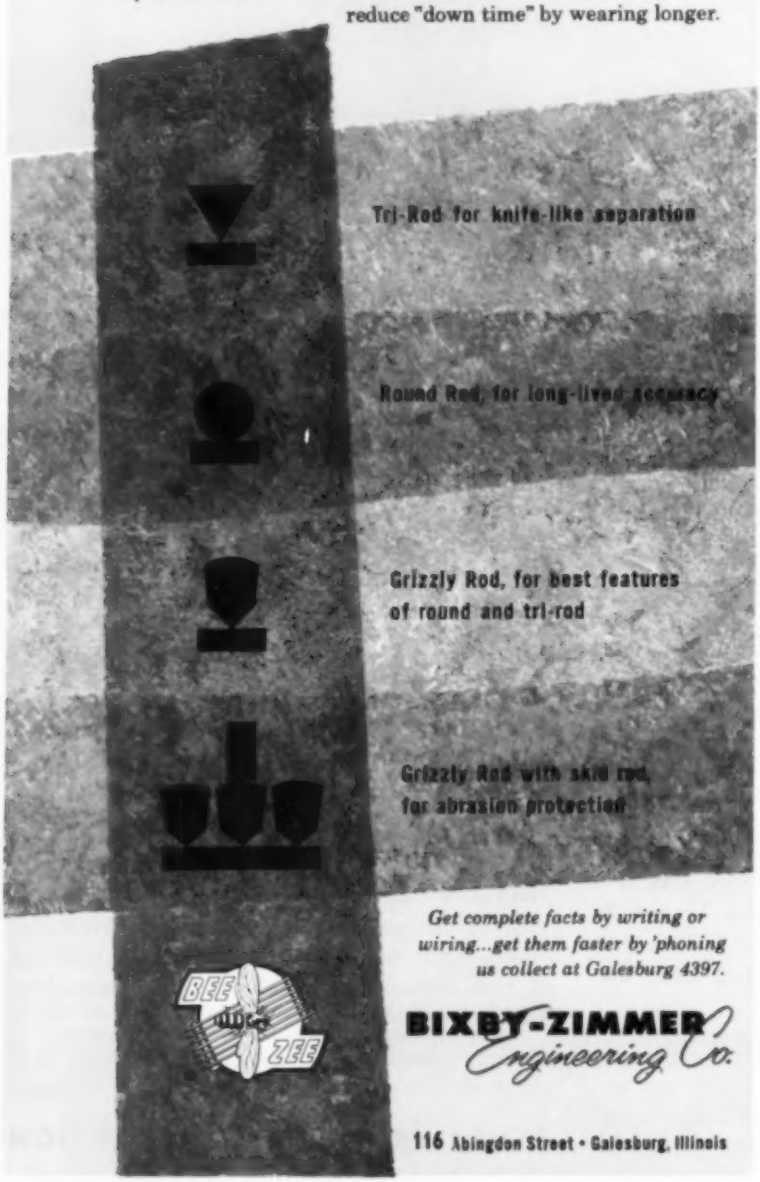
5631 West 65th Street, Chicago 38, Illinois

BEE-ZEE SCREENS

lower moisture
raise BTU's
halt freeze-ups
speed sales

When Bee-Zee Screens put their efficiently-shaped rods to work "squeezing" that extra percentage of water out of your coal – *it makes you money!* Moisture content is lowered... your customers get more BTU's per ton... winter freeze-ups are avoided... and all of these advantages are reflected on your sales chart.

Bee-Zee Screens are made in the exact size and shape for your equipment – with the exact rod design for your operation. They're 100% stainless steel, electronically precision-welded. Bee-Zee Screens can't rust, can't corrode – and reduce "down time" by wearing longer.


Tri-Rod for knife-like separation
Round Rod, for long-lived accuracy
Grizzly Rod, for best features of round and tri-rod
Grizzly Rod with skid rod, for abrasion protection

Get complete facts by writing or wiring...get them faster by 'phoning us collect at Galesburg 4397.

BIXBY-ZIMMER *Engineering Co.*

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treads that have become worn and dangerous. Using the Wooster method stairs can be restored to a better than new condition, according to the company. The brochure advertises a selection of Wooster extruded and cast metal safety stair treads that the company recommends for stairway repair.

SWAGED HOSE ASSEMBLY—Catalog S-1, being distributed by the Weatherhead Co., Ft. Wayne Div., shows the complete line of Weatherhead swaged hose, hose ends and adapters. Featured in the catalog is a simple, detailed swaged hose assembly numbering system. Hose assemblies of any size, type, length, pressure and quantity can be ordered quickly and easily. 128 W. Washington Blvd., Ft. Wayne, Ind.

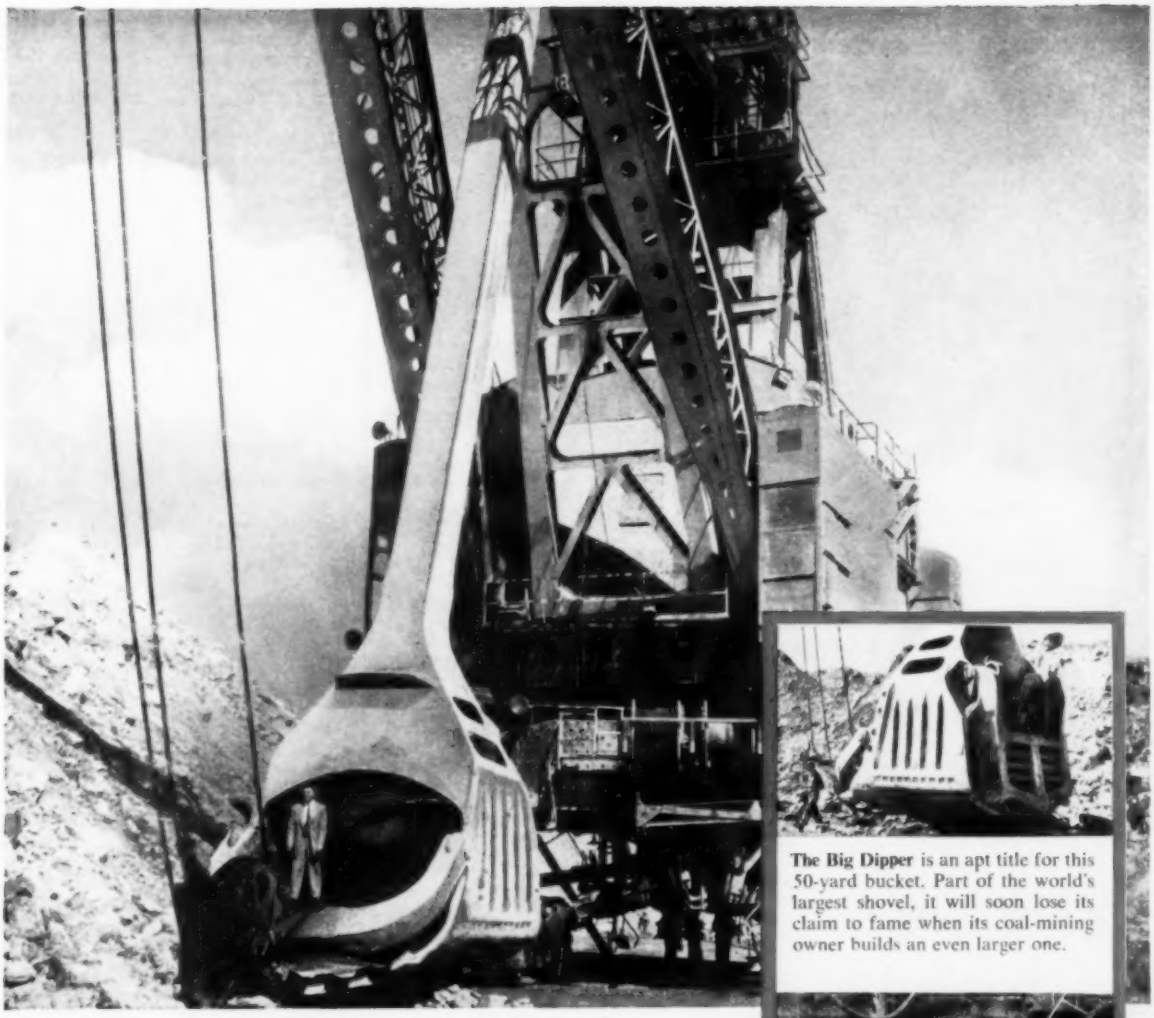
HOSE COUPLING—Bulletin 240, by Snap-Tite, Inc., Union City, Pa., describes the quick-connecting-disconnecting "H" coupling, its uses and construction. Particular reference is made to what the company labels its exclusive U-packer, which is said to give positive seal without compression set induced by rubber distortion. Dimensions of all "H" coupling parts are listed.

ANTI-CORROSIVE SYSTEM — The Harco Corp., 16921 Broadway, Cleveland, Ohio, offers a technical brochure named "Cathodic Protection Systems for Corrosion Control." The brochure describes the corrosive effect caused by the galvanic action of metals in contact with earth or water. The principles utilized by the "Harco System" to halt corrosive action or to keep installations free of significant corrosion damage are described and illustrated. Cathodic protection of underground pipe lines and savings said to result are also described.

INDUSTRIAL EQUIPMENT—A new catalog of industrial equipment has been announced by the General Industrial Co., 5746 N. Elston Ave., Chicago 30, Ill. The company's standard line includes steel shelving, lockers, storage cabinets, inter-communication systems and plastic drawer cabinets suitable for small tools and nails.

WATER HOSE—A data sheet describing its line of water hose has been issued by the B. F. Goodrich Co., Industrial Products Div., Akron, Ohio. The sheet describes special hose constructions available for such specific uses as wetting dust in coal mines; long-length heavy-duty hose for construction projects, road building and other high pressure uses; pile-driving operations, hydraulic bank grading and stripping and sluicing. Sizes, pressures, coupling information and construction features for each type of hose are listed.

DRAINAGE, CONSTRUCTION—Armco Drainage & Metal Products, Inc., has printed a condensed catalog of its drainage and construction products. These include corrugated metal pipe, pipe-arch, multiplate pipe, perforated pipe, bin-type retaining walls, tunnel liner plates, "Steelox" buildings, steel sheet-



The Big Dipper is an apt title for this 50-yard bucket. Part of the world's largest shovel, it will soon lose its claim to fame when its coal-mining owner builds an even larger one.

Quiet, Cities Service at Work! In the mammoth gears beneath the shovel, Cities Service Trojan L Compounds give outstanding lubrication. They were chosen by the owner for all mechanized equipment.

Even the Trucks are Giants! Each big Euclid carries a 60-ton payload. Gear failure would be extremely costly. But that's no problem with Trojan L Compounds for lubrication.

Find the Cities Service Lubrication Engineer

Henry Zielasko, the Cities Service Lubrication Engineer in this picture, may look small, but he's no drop in the bucket in the operation of the world's largest shovel.

The reason: Henry supplies the gear lubricants—Cities Service Trojan L Compounds—for *all* the equipment owned by this giant mining company. And, to get the job, his Cities Service lubricants had to prove their superiority in rigid tests against those of every major competitor.

Henry, and the many other skilled Cities Service Engineers like him, are prepared to prove the merits of themselves and their products to you in the same manner. Put them to the test! Call your nearest Cities Service office, or write: Cities Service Oil Co., Sixty Wall Tower, New York 5, N. Y.

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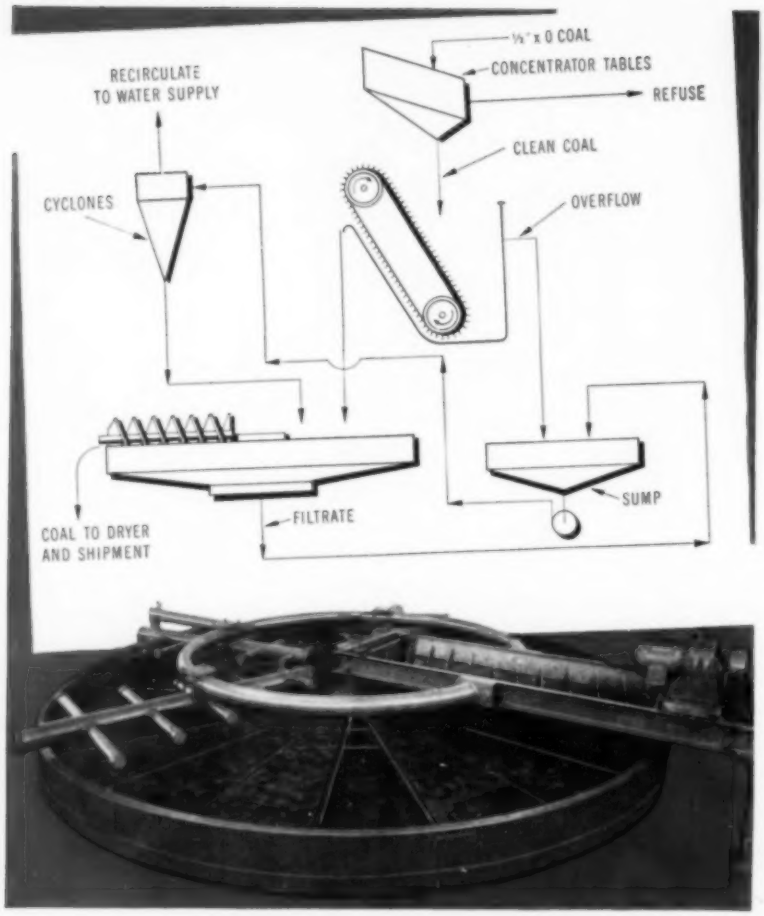

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The recovery of ½" x 0, cleaned coal from suspension in water with minimum breakdown in size plus the elimination of stream pollution was the problem at the Ernest Plant of the Rochester and Pittsburg Coal Company.

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ing, "Flex-Beam" guardrail, "Smooth-Flo" corrugated metal sewer pipe and water control gates. Catalog 10855, Product Information Service, Armco Drainage & Metal Products, Inc., Middleton, Ohio.

CHAINS, DRIVE WHEELS — "Dura-Tred" chains and Beaumont drive wheels for bucket elevators and conveyors are described in Catalog DC-855, offered by Beaumont Birch Co., 1505 Race St., Philadelphia 2, Pa. The catalog describes the chain as the "chain with the wear tread." The company's traction, sprocket and "Trac-Pull" wheels are also shown. Types of available chains are listed along with various metals from which the chains can be made. Combination and pintle types of chain are illustrated with complete lists of available sizes. Full details on drive wheels incorporate pitch diameter, bore and weight data.

HOSE FITTINGS, COUPLINGS—A data sheet on hose couplings and fittings has been announced by the B. F. Goodrich Co., Industrial Products Div., Akron, Ohio. Among the couplings illustrated are short and long shank common couplings, barbed insert, quick-acting, "Barway" reattachable, interlocking high pressure, "Permalock Type D" and Type 68 reattachable couplings. Other methods of joining hose described in the new data sheet include "Punch-Lok" clamps, menders and nipples, inserted pipe nipples, combination nipples, built-in pipe nipples, "Flexseal" hose joint, flanges and integrally flanged hose ends.

SUBMERSIBLE PUMP FILM—A film on submersed pumping is being distributed by Byron Jackson. Titled "The Submersible Story," the film is said by the company to be the first completely factual story of the submersible pump—its history and development as well as its construction and operation. The submersible's progress from early designs to present day applications and installations is shown. Animation is used to illustrate the operation of key submersible parts, including the mechanical and mercury seals. Byron Jackson Pumps, Box 2017, Terminal Annex, Los Angeles 54, Calif.

MAGNETITE FOR COAL SEPARATION—A technical bulletin issued by Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa., outlines the uses for magnetite in heavy media washing and separation, particularly in preparing coal for marketing. The report covers the various applications of magnetite and how coal preparation systems using this heavy media save time and money in cost-per-ton of finished product. Included is a table of specifications and the physical properties of Orefraction magnetite used for heavy media separation. Sizes from 50 to 325 mesh are tabulated as are the specific gravity and percent of magnetics so that the most suitable magnetite may be specified for specific separation systems.

ADJUSTABLE SPEED DRIVE—Bulletin 4400-PRD-229, printed by the Electric Machinery Mfg. Co., Minneapolis 13, Minn., illustrates "Ampli-Speed" magnetic drive. The folder explains the

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drive's use for both fan-type (centrifugal fans, pumps, compressors) and constant-torque loads (conveyors, mixers, machine tools). Construction features are illustrated. Drawings show the relationship of the drive to its magnetic amplifier control, the driving motor and driven load. The folder gives detailed information on horsepower ratings, speed ranges and speed control precision for both variable- and constant-torque loads.

WORM GEAR ASSEMBLY—Engineering details describing the assembly procedure of "Cone-Drive" double-enveloping worm gearing are contained in a bulletin available from Cone-Drive Gears, Div. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Bulletin CA-55 covers methods of assembly using tapered roller bearings, now standard equipment on both worm and gear shafts. Typical alignment conditions and instructions for correcting misalignments are included.

NICKEL PLATING—A technical manual on "Bart 'lectro-clad" nickel-plated steel has been made available by the Colorado Fuel & Iron Corp., 575 Madison Ave., New York 22, N. Y. The manual describes 'lectro-clad nickel-plated products and presents manufacturing techniques and fabrication procedures, including forming, welding, cleaning, handling and testing methods. The CF&I process deposits clear nickel on steel plate products in any thickness from 0.006 to 0.02 in. The resultant nickel-plated steel can be shaped, fabricated, roll-formed, die-formed, flame-cut, sheared and welded without damage to the plating, the company says.

LATTICE MOUNTINGS—A bulletin describing the features and applications of bonded rubber lattice mountings is being distributed by the Lord Mfg. Co., 1635 W. 12th St., Erie, Pa. Lattice mountings are designed, says the company, to solve problems of low-frequency high-amplitude vibrations in heavy industrial machinery. They are produced in a variety of sizes with static deflections from ¼ 1½ in and capacities from 250 to 3,000 lb per mounting. The booklet illustrates the mounting in use on a vibrating screen, foundry shakeout and heavy motor-generator. A list of additional uses, dimensions and capacity data are included.

CONTROL TRANSFORMERS—A catalog describing its complete line of control transformers is being distributed by the General Electric Co., Schenectady 5, N. Y. The catalog, GED-2767, includes auto transformers, machine-tool transformers and special application models. It contains ratings, dimensions, product features, model numbers, prices, weights and wiring diagrams. A special section shows panel and machine-tool voltage-regulation curves for use in selecting the proper transformer for given applications.

LUBRICANT DATA—Bulletin 105, covering "Molykote" Types 165X and "Loex" lubricants, has been revised, according to the company, to include test data that compares "Molykote" 165X

Wire Rope at Work — Here's an installation that any mine owner could show with pride. It is the "A" shaft headframe at Peterson Mine, in Michigan's Gogebic Range. The Peterson property, which yields large tonnages of iron ore, is operated by Puritan Mining Company, Ironwood.

The largest, sturdiest shaft ropes ever used in the region give added distinction to this trim installation. The balanced skips and the balanced cages require four separate ropes, the pair for the skips being 2¼-in. diameter, those for the cages 1¾-in. All of these husky wire ropes are of Bethlehem manufacture—Purple Strand grade, of course. Purple Strand is Bethlehem's best, and here, as in mines and quarries all over the country, this tough wire rope is more than equal to the jobs assigned it.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:
MINING • QUARRYING • CONSTRUCTION • PETROLEUM • EXCAVATING • LOGGING • MANUFACTURING

BETHLEHEM STEEL
BETHLEHEM WIRE ROPE

with a widely-used conventional open-gear lubricant in terms of frictional torque versus jaw load on a Falex testing machine. The Alpha Molykote Corp., Stamford, Conn.

CONCRETE FORM COATING — A folder describing Stonhard form coating, a coating that cannot be "soaked up" by wood forms or "drained away" on metal forms, is being distributed by the Stonhard Co., 1306 Spring Garden St., Philadelphia 23, Pa. The company says that concrete "stocking" is overcome and rub-down is eliminated. The bulletin lists six other Stonhard products.

ROCK, ORE CRUSHING—"Measuring the Crushing Resistance of Rocks and Ores," a booklet written by Benjamin B. Burbank, a metallurgist, is available from Pennsylvania Crusher Div., Bath Iron Works Corp., W. Chester, Pa. Methods and means for measuring the crushing resistance and abrasiveness of rocks, minerals and ores are described in detail.

CENTRALIZED LUBRICATION — "Studies in Centralized Lubrication 1955" features the experiences of Farval centralized lubricant customers. The centralized system, as it has been applied in actual cases to open gears, a slitting and shearing line, a turbine, engine production and power shovels, is described in detail. The Farval Corp., 3249 E. 80th St., Cleveland 4, Ohio.

VIBRATING FEEDER — Richardson Scale Co. is distributing a bulletin describing its mechanical vibrating feeder, traded under the name "Velofeeder." The feeder is designed to facilitate a steady flow of any loose bulk material into such processing machinery as grinding mills, pulverizers, mixers, conveyors and elevators. The bulletin outlines the operating principles and specifications of the feeder, which, the manufacturer says, can be electronically synchronized to match the flow speed of other equipment. Bulletin 55C, Richardson Scale Co., Van Houten Ave., Clifton, N. J.

SOLENOID-OPERATED BRAKES — Bulletin EE-180, being distributed by Trombetta Solenoid Corp., 329 N. Milwaukee St., Milwaukee 2, Wis, describes the SB-300 line of solenoid operated shoe brakes. Linings, heat dissipation, brake stability, springs, adjustability and brake mountings are treated individually in the bulletin.

GENERAL CATALOG—Okonite Catalog lists trade names and applications of all Okonite general products. Two selection charts, one based on application and environment, the other based on cable type, are said by the company to be a practical guide in selecting insulated electrical cable for each use. Minimum standard industry specification requirements are also listed for each insulation and covering where applicable. Bulletin 1096, The Okonite Co., Passaic, N. J.

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Subsidiary, LUDLOW-SAYLOR WIRE CLOTH CO.

COAL MEN ON THE JOB

SECOND SHIFT SECTION FOREMEN, mine 214, Consolidation Coal Co., McRoberts, Ky. Kneeling, left to right, Willie Baker and Otto Meddings; standing, left to right, Frank Howard and Estill Mullins.

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NEWS ROUND-UP

Kaiser Backs Coal, Aluminum With Cash Vote of Confidence

The biggest news for coal last month came from a company that bet cash on coal's future and on the future of its own industry. The industry was aluminum. The company was Kaiser Aluminum & Chemical Corp., which planned to build a reduction plant (Ravenswood, W. Va.) powered by electricity from coal-fired steam turbines. The reduction plant would cost $120,000,000, Kaiser said, but this sum was only part of a $280,000,000 master expansion move that will include a $60,000,000 aluminum refinery in Gramercy, La., and a $100,000,000 expenditure for chemical and mill fabricating facilities.

For coal the immediate expectation was an annual boost in consumption of nearly 2,000,000 tons after construction of the Ravenswood plant by 1957. But there was more than that. If other aluminum producers followed Kaiser with expansions of their own—and it seemed likely—an increase that could reach 20,000,000 tons was seen in coal consumption during the next several years.

For Kaiser the Ravenswood plant was expected to boost aluminum capacity to 654,000 tons a year, raising the company to the No. 2 producing position—behind Alcoa, but ahead of Reynolds Metals. Ravenswood will also make Kaiser the owner of the largest single reduction plant (220,000 tons a year).

The tonnage will more than double Kaiser's present output and will be in line with the company's own forecast that the nation's aluminum consumption will double by 1965 (2,000,000 tons to 4,000,000 tons).

The same forecast seemed also a forecast for coal, especially for coal producers in the vicinity of the Ohio Valley. For if the expected aluminum consumption increase occurred—and it seemed likely that it would if aluminum continued to invade diversified products fields—three factors would pull aluminum producers toward the use of coal-derived power and the Ohio Valley.

1. Assurance of an adequate, long-range supply of economical power. (Kaiser signed a 40 yr pact with Ohio Electric Co., Canton, Ohio, to deliver 450,000 kw from a six-state grid operated by subsidiaries of American Gas & Electric. The system's plants are coal-fired.)

2. Proximity to markets. (Some 70% of the United States aluminum market is within 500 mi of Ravenswood.)

3. The navigable Ohio and, in the case of Kaiser, the Mississippi. (Kaiser mines bauxite, or aluminum ore, on the island of Jamaica in the British West Indies. The ore is shipped to Baton Rouge, La., for processing into aluminum oxide. From its new plant in Gramercy, La., Kaiser plans to barge-ship the oxide to Ravenswood.)

Kaiser Aluminum's switch to coal-generated power is the second major move toward coal by any aluminum producer. Usually oil, gas or water have provided the power. Only Alcoa preceded Kaiser in using coal for smelting, or reduction. In 1952 Alcoa, working with the Texas Power & Light Co., constructed a plant in Rockdale, Tex., designed to produce 170,000,000 lbs of aluminum annually. The plant includes facilities for mining lignite.

D. A. Rhoades, vice president and general manager of the Kaiser Corp., saw in the fuel switch a continued supply of power. "Perhaps the most important factor of all," Mr. Rhoades declared, "is the assurance of an adequate long-range supply of economical power derived from coal."

Commenting on the significance of the power switch, Philip Sporn, president of the American Gas & Electric Co., said that gas as a fuel to drive turbines and produce electric power has increased in cost.

As for water power, he said, "the diminishing number of remaining hydroelectric sites that are economically desirable, coupled with the severe limitation of being located remotely from centers of industrial activity and markets, makes hydro unavailable as a source of large power supplies required for the expansion of the aluminum industry.

"This brings coal and coal-based generation sharply into the picture," he continued. "This picture is particularly bright where the coal reserves are ample and high-grade and where modern techniques of mining are introduced. Where this coal lies on navigable water, and this is true in a large section of the Ohio Valley, it offers an ideal combination of favorable economic factors for the development of large-scale, economical coal supplies required in large aluminum reduction operation."

And as December drew toward a close, other aluminum companies seemed to be agreeing with the Sporn logic. The Olin-Mathieson Chemical Corp. was expected to announce a plan to build a 60,000-ton aluminum plant near Cresap, W. Va. Another company, Reynolds Metals, was known to have been studying sites and power arrangements for a 100,000-ton plant in the Ohio Valley. The St. Joseph Lead Co., in combination with Pittsburgh Consolidation Coal Co., was expected to construct a 66,000-ton plant in Josephtown, Pa.

In This Section

News Briefs	112
Preparation Facilities	112
Around The World	114
Coal Mining Institute	116
Personal Notes	121
Association Activities	124
Obituaries	124
Among the Manufacturers	128

Crucible Steel Winner In Mine Safety Case

Crucible Steel Co. of America has won a victory over safety inspectors of the U. S. Bureau of Mines in a dispute involving the area of a mine that must be rock-dusted. The decision will affect federal safety regulations in all mines engaged in interstate commerce.

Two points were at issue: one was the contention of the bureau inspectors that if an area in a mine had once been rock-dusted, it should continue to be rock-dusted. The second was a dispute over the area of mine back entries, which must, under law, be rockdusted.

Two inspectors had ordered Crucible to close a Pennsylvania mine July 30 because the company had refused to maintain rock dust in certain back-entry return airways where rock dust had been applied in the past.

The Federal Coal Mine Safety Board of Review, in its ruling on Point 1 against the USBM inspectors said that past application of rock dust is not of itself sufficient to require the maintenance of rock dust at a minimum of 65% incombustible.

The second point revolved around what Congress meant by its legislation calling for rock-dusting back entries "for at least 1,000 ft outside the junction with

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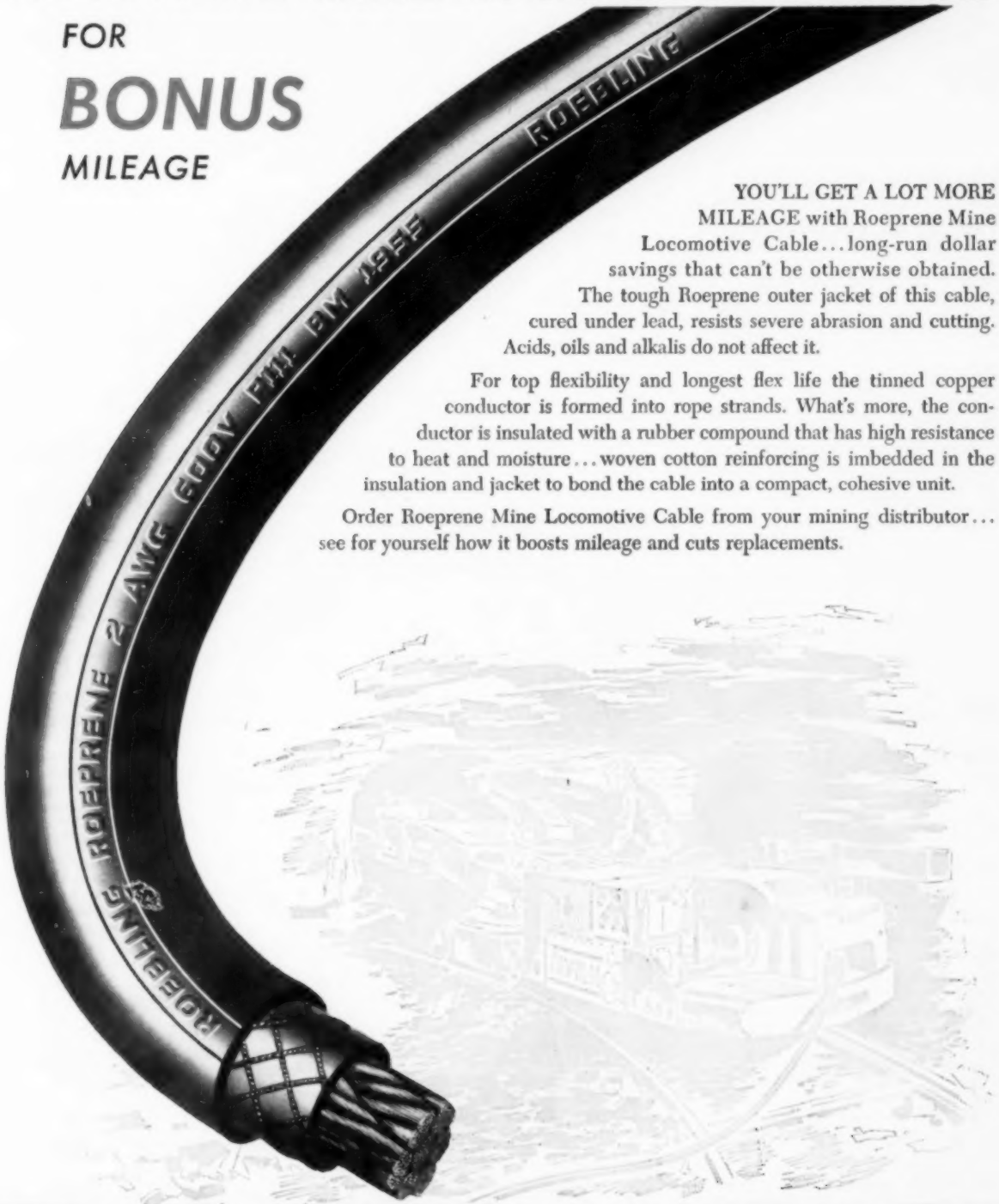

YOU'LL GET A LOT MORE MILEAGE with Roeprene Mine Locomotive Cable... long-run dollar savings that can't be otherwise obtained. The tough Roeprene outer jacket of this cable, cured under lead, resists severe abrasion and cutting. Acids, oils and alkalis do not affect it.

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the first active entry." Bureau inspectors contended that "active entry" meant any entry in a mine actually "in use." The review board rejected that interpretation, holding that the phrase meant not the intersection with an entry "in use," but the "junction with the first entry in which coal is being mined in each working section of the mine."

USBM Sweetens Policy Of Safety Enforcement

Some of the sourness was removed from the U. S. Bureau of Mines' system of recording safety violations with the announcement last month of a relaxed, but trial, policy. The USBM announced that beginning Jan. 1, 1956, promptly corrected safety violations would not be reported by inspectors. The new policy, the bureau said, would be tried for a year and was aimed at determining whether the coal industry would "cooperate" in complying with the Federal Coal Mine Safety Act and with federal mine safety regulations. Compliance, the bureau said, would mean continuation of the relaxed policy. Noncompliance, it warned, would mean a return to the past system of reporting violations, whether corrected immediately or not. Unfazed by the year-long trial period gauntlet, operators hailed the move as a "progressive step."

File Gas Import, Export Applications With FPC

Two applications, one seeking permission to import natural gas from Canada, the other seeking permission to export to Canada, were awaiting hearings last month by the Federal Power Commission. One application was filed by Midwestern Gas Transmission Co., which seeks to import up to 204,000,000 cu ft daily that it would buy from Trans-Canada Pipe Lines, Ltd., near Emerson, Manitoba. Midwestern is also seeking permission to purchase a similar amount from Tennessee Gas Transmission Co. at Portland, Tenn., to sell to utilities and cities along a proposed 1,760-mi route from Portland through Tennessee, Kentucky, Indiana, Illinois, Wisconsin and Minnesota to the Canadian border.

The other application was made by Tennessee Gas. It sought approval to sell more than 86,000,000 cu ft daily to Trans-Canada, near Niagara Falls, N. Y., for export to the Montreal area. The distribution is planned for 3 yr until Trans-Canada begins delivering in eastern Canada via a planned all-Canada line. In Canada the government announced that the most expensive portion of the line would be constructed by a crown company at a cost of more than $117,000,000. The line will then be leased to Trans-Canada.

Meanwhile, in the United States coal and oil men were forecasting fiercer opposition to the newest gas applications than they had formed against the move by Pacific Northwest Pipeline Corp. to import 300,000,000 cu ft a day. The FPC had at first denied the Pacific Northwest application, but approved a second application that authorized a "supplementary" source of supply. Although oil felt the impact of the Pacific Northwest gas import approval most of all, some 390,000 tons of coal were also displaced. Observers now say that Midwestern will attempt to show the FPC that the gas it seeks to import from Canada will be "supplementary" to its present source of supply.

Utilities Set Coal Record

Electric utility power plants broke the monthly record for coal consumption when they burned 12,659,000 tons during October, according to a National Coal Association report. The previous monthly high, established in August, was 12,588,719 tons. A year earlier, NCA reported, October consumption was 10,336,032.

Clinchfield Mine Output Estimated at 4,000 TPD

Clinchfield Coal Corp. disclosed last month that it had approved plans and had begun construction of a new mine near Cleveland, Va., at a cost of $4,000,000. The new mine, Moss No. 2, was scheduled to open August 1 and was expected to produce 4,000 tpd when working at full capacity late this year. Preparation equipment, according to information from Clinchfield Corp., includes Link-Belt heavy media washers, Deister tables and Multilouvre dryers.

The mine will be served by the Norfolk & Western Railways which has been authorized by the Interstate Commerce Commission to build a 6-mile spur from Carbo, Va., to the mine site near Cleveland, Va. Some 375 men will be employed during peak capacity.

Bituminous Output

YEAR TO DATE	PRODUCTION
Dec. 10, 1955	439,462,000 tons
Dec. 11, 1954	368,132,000 tons

1955 output 19.4% ahead of 1954

A month earlier through Nov. 12, 1955 output was 19.4% above 1954

WEEK ENDING	PRODUCTION
Dec. 10, 1955	10,760,000 tons
Dec. 11, 1955	8,878,000 tons

Anthracite Output

YEAR TO DATE	PRODUCTION
Dec. 10, 1955	23,339,000 tons
Dec. 11, 1954	25,313,000 tons

1955 output 7.8% under 1954

A month earlier 1955 output was 7.6% under 1954

WEEK ENDING	PRODUCTION
Dec. 10, 1955	562,000 tons
Dec. 11, 1954	631,000 tons

Consolidation Coal Plans One Of Largest Mines

Last month the nation's largest coal producer, Pittsburgh-Consolidation, planned to add even more tonnage to the 20,000,000 tons of coal it mines each year. In mid-December, a Pitt-Consol subsidiary, Consolidation Coal Co. (W. Va.), Fairmont, W. Va., disclosed that it would be opening one of the largest mines in the United States near Fairview, W. Va. Consolidation's president, George R. Higinbotham, said that the multimillion dollar mine would produce some 15,000 tpd when completed in 18 to 24 mo. The mine would employ some 800 men, he said.

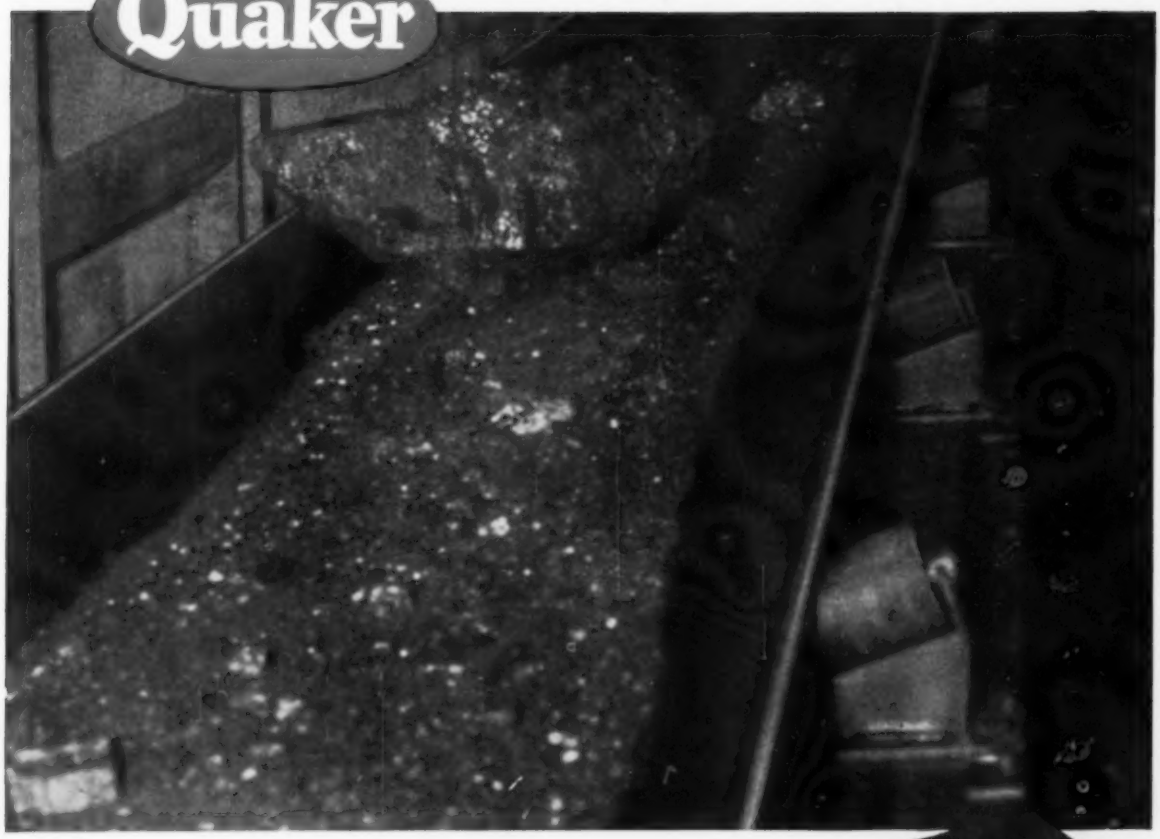
The company plans to let the first contract for construction of a 3,000-ft slope from the surface to the Pittsburgh coal seam.

Once before development was begun on the site, but the operator, Jamison Coal & Coke Co., abandoned it in 1953. Pitt-Consol acquired the holdings.

AEC Plans Atomic Assist To Make Gas From Coal

Gas from coal continued to make news last month with the disclosure that the Atomic Energy Commission would begin a project to develop an atomic reactor to produce synthesis gas. The disclosure was made by W. Kenneth Davis, director of the AEC's Reactor Development Div. Mr. Davis said that a program would not be ready for several months and that

Quaker



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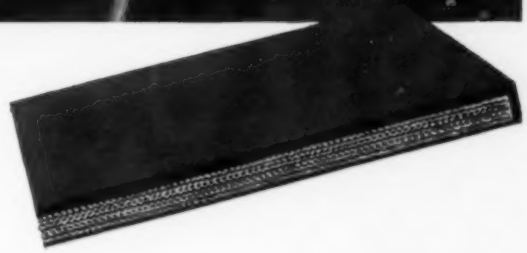

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development of a high-temperature reactor would take at least 5 yr.

The current method of gasifying coal (burn coal and pure oxygen, add steam) is a costly process. Oxygen and coal-burning account for half the high cost. But if an atomic reactor provided the heat (2,000 to 3,000 deg), steam and pulverized coal could be shuttled through a nuclear plant, absorbing heat on the way and emerging as gas.

Fuels Guide Editors See 46% Fuels Use Jump

Keystone, publisher of the *Keystone Coal Buyers Manual* and an affiliate of *Coal Age*, has announced the publication of the 1955 edition of the "Keystone Guide to Fuel Consumption by Utility Steam Electric Plants." At the same time the editors, Joseph R. Forsythe and George F. Nielsen, forecast a 46% increase in electric plant fuel consumption by 1959. The prediction was based on data used in the new guide which, they noted, was provided by the electric utilities themselves.

Detailed information covering fuel burning plants has been included in the "Guide to Fuel Consumption." Names and addresses of executives responsible for fuel supplies, details of generating capacities, the use of fuels and planned expansions also have been published.

Keystone breaks down its prediction of a 46% increase in this way: Fuel use in 1955, in terms of millions of tons of coal equivalent, will probably exceed 203,000,000, a boost of 22,000,000 over 1954's 181,000,000. The publication's projections for future years: 223,000,000 in 1956; 236,000,000 in 1957; 254,000,000 in 1958; and 265,000,000 in 1959. By 1959, according to Keystone, coal will gain 52%, oil 47% and gas 30%. Keystone, 330 W. 42nd St., New York 36, N. Y., $20.

Order Bonding For Owners Fighting Minimum Wage

Some 550 operators from Pennsylvania and Virginia last month succeeded in getting a temporary hold order from Federal District Judge Edward A. Tamm exempting them from paying a government-ordered hourly wage minimum of $2.25. But in less than a week the government had countered with another order. This one went to procurement agencies and ordered the agencies to require the Virginia and Pennsylvania mine owners to post bond before awarding them contracts.

What the government had tried to do in its wage minimum order, it had argued in court, was require producers of bituminous for the government to pay approximately the same wage required under United Mine Workers contracts. But 67 members of the Central Pennsylvania Open-Pit Mining Association, banding with 487 more operators from Virginia, declared that they would be driven out of business if forced to pay miners $2.25. Miners in Pennsylvania were getting $1.40 an hour. Those in Virginia were getting $1.25.

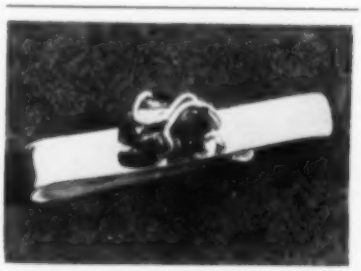
And although the action was seen as a "tempest in a teapot" last month, the contention that the Secretary of Labor was acting illegally could reverse the wage order. Once before a government maneuver to fix wages failed when an order directed at the textile industry was defeated in court. Meanwhile the nearly 500 Virginia operators are being required to post 50c a ton as bond on each ton of coal they mine for the government. The Pennsylvania operators are required to post 40c.

Island Creek Slates Red Jacket Coal Purchase

Island Creek Coal Co., Huntington, W. Va., has announced its directors have approved a plan to trade 250,000 shares of Island Creek common stock and $1,000,000 for the physical assets, leaseholds, stores and sales facilities of the Red Jacket Coal Corp., Columbus, Ohio. The effective date of the transaction was still undetermined last month, but Raymond E. Salvati, Island Creek president, said that "necessary legal and technical details and necessary consents should be accomplished at an early date."

Upon completion of the transaction, Island Creek will acquire substantial reserve acreages of high, medium and low-volatile coals in West Virginia and Virginia, and seven modern operating properties producing some 4,000,000 tons a year. The mines, each with its own preparation plant, are situated at Red Jacket, W. Va., Coal Mountain and Wyoming, W. Va.; and Keen Mountain, Va.

Mr. Salvati, who disclosed that the two companies had been "negotiating for quite some time," said that the "acquisition will increase Island Creek's projected annual sales volume from 14,000,000 tons of owned and agency coal to 18,000,000 tons." He added that Island Creek's reserves of high-grade coals would also be "substantially increased."



Anthracite, Silver Tie Clasp

The newest addition to anthracite costume jewelry apeared last month. A tie clasp fashioned from hard coal and sterling silver was being sold on New York's Madison Avenue for $4.95. Designed by LeBeau of New York, the clasp matches hard coal cuff links announced last fall. More information from the Anthracite Information Bureau, 342 Madison Ave., New York 17, N.Y.

Preparation Facilities

Consolidation Coal Co., No. 3 mine, Byrne, W. Va.—Contract closed with Deister Concentrator Co., for 20 Super-Duty Diagonal Deck No. 7 coal washing tables and three Concenco revolving feed distributors, Model 108-B.

Jewell Ridge Coal Corp., Melville No. 9 Mine, Stollings, W. Va.—Contract closed with Heyl & Patterson, Inc., Pittsburgh, Pa., for cleaning plant to wash and dry 80 tpd of ⅜ or ¼x0 coal with 8 Deister tables, Reineveld centrifuge, 6 Disc-8-ft 10-in filter and 16-ft C-E Raymond flash dryer. Completed date June 15, 1956.

Christopher Coal Co., Humphrey Mine, Morgantown, W. Va.—Contract closed with Heyl & Patterson, Inc., Pittsburgh, Pa., for cleaning plant addition to dry 720 tph of ⅜x0 coal with twelve Reineveld centrifuges.

News Briefs

The Ohio Edison Co. announced last month that it would spend $62,000,000 for the construction of a 340,000-kw generating plant at Stratton, Ohio, on the Ohio River. Walter H. Sammis, president, said two steam-electric generating units, each 170,000 kw, would be installed. Construction is expected to begin next summer with the first unit working in 1959. The announcement meant that Ohio Edison has scheduled a total of 520,000 kw additional between 1957 and 1960. It will increase the system's capacity to 2,220,000 kw.

All phases of deep and strip mining will be covered during eleven sessions of the 1956 coal convention of the American Mining Congress May 1-9, in Cincinnati. The opening session will be devoted to addresses on "Coal's Future" and "The Railroads and the Coal Industry." The addresses will be given by top coal and railroad executives. At other sessions the topics will be maintenance, coal preparation, continuous mining, roof support, industrial engineering, cost controls, haulage and power.

The Office of Defense Mobilization has asked the more than 50 oil-importing companies in the nation to report monthly on their actual and planned imports of oil. Although the reports are not mandatory ODM Director Arthur Flemming

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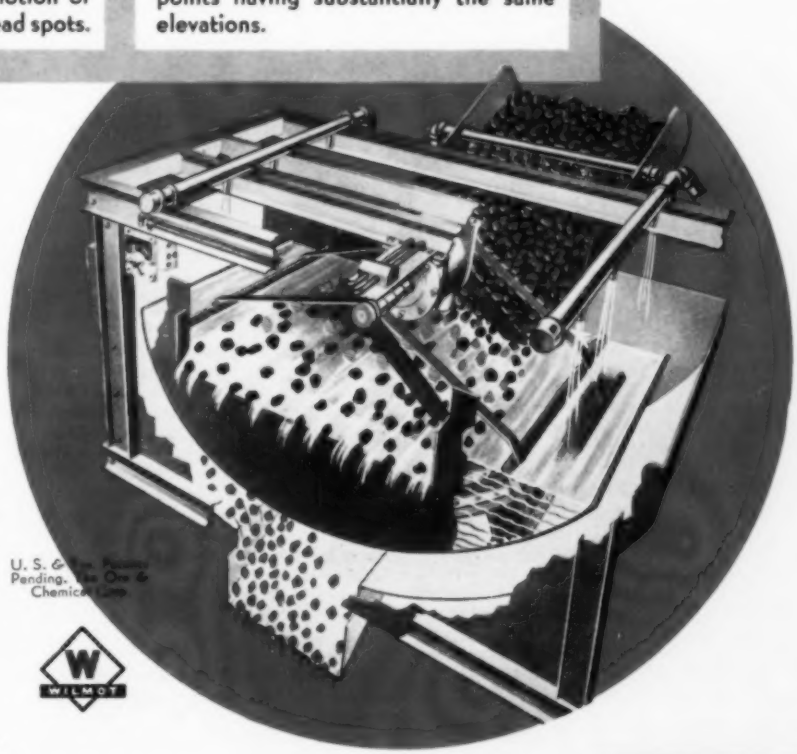

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said in a letter to the companies that the information was necessary "to determine the extent to which voluntary action has been taken by oil importers to restrict imports."

Construction of the first coal-burning gas turbine locomotive was expected last month to begin in 1957, according to Colonel R. B. White, chairman of the Locomotive Development Committee of Bituminous Coal Research, Inc. Test work is being conducted at Dunkirk, N. Y., in the locomotive plant of Alco Products. The testing, covering a coal-handling system, combustor, ash separator and the turbine's blading, is expected to be finished this year. Although General Electric recently accepted orders from the Union Pacific Railroad for fuel-oil-fired gas-turbine engines, General Electric is reportedly continuing its research for a coal-burning gas turbine.

The Norfolk & Western Railway has authorized the purchase of 4,000 new freight cars to cost about $30,000,000. The cars will be built in the railroad's own shops. The authorization brings to 9,100 the number of freight cars the N&W has ordered during 1955. R. H. Smith, president of the road, said that "the fact that 8,000 of the cars are open-top, or coal-carrying cars, is evidence of the railroad's faith and optimism in the coal industry."

The Chesapeake & Ohio Railway is planning to purchase 7,000 coal hoppers and 1,000 gondolas. The equipment will cost the company $55,000,000.

Justin Potter, recently seller of the Nashville Coal Co., has purchased 6,358 acres of coal rights in three tracts in Henderson County, Ky., reportedly for $50,000. A spokesman for Mr. Potter, H. L. Reese of the Kentucky Land Co., said that the purchase was merely an investment and that Mr. Potter had no plans for the land. The land purchase was the second made by Mr. Potter in Kentucky. He recently purchased 1,200 acres of rights in another county. He also holds rights in Henderson County close by a site where Reynolds Metals also has been buying rights—these in preparation for an aluminum reduction plant.

Clinchfield Coal Corp., a subsidiary of Pittston Co., has organized a lumber division to develop 100,000 acres of forest property in its southwestern Virginia holdings. The company says more than 72,000,000 board feet of mature timber is ready for harvesting.

A $200,000 coal processing plant will be built in Monarch, Wyo., according to officials of Koal Krudes, Inc., Spokane, Wash. The plant will be used to recover coal char and creosote from low-grade coal. About 200 tons will be processed daily from the strip mines of the Big Horn Coal Co.

The United Mine Worker's Welfare fund is expected to take in its billionth dollar this year. The Washington headquarters of UMW announced last month that the fund had taken in nearly $900 million. Some $18,000,000 of the money has been used to construct 10 hospitals in West Virginia, Virginia and Kentucky. The fund has also been used to pay out $330,000,000 in pensions, $246,000,000 for hospital and medical care, $105,000,000 to disabled miners and $76,000,000 to widows and other survivors of miners.

Potash Co. of America plans an exploratory tunnel in search of phosphate deposits and as a test of mining costs in Bear Lake County, Idaho. J. P. Hesler, engineer in charge at Montpelier, Idaho, said for the firm that a test would be made to apply coal mining methods to phosphate rock extraction.

Gov. William S. Stratton, of Illinois, has named five men to the state mining law investigation commission which will determine whether mining law changes are needed for the safety or for the conservation of coal deposits in Illinois. The members of the commission are: R. B. Cochran, president, Blue Bird Coal Co; H. C. McCollum, Springfield, vice-president, Peabody Coal Co.; Felts Goodrich, Belleville; Sherman Whitlow, Belleville; and John C. Frye, Urbana, chief of the Illinois State Geological Survey, University of Illinois.

The Bureau of Mines last month announced establishment of a coal-testing laboratory in Alaska to help insure the delivery of quality fuel to air bases and other federal establishments in the Territory. Alaska now has seven producing mines, most of whose output goes to government bases.

Edward G. Fox, president of Philadelphia & Reading Corp., announced last month that an agreement has been reached between the company's wholly-owned subsidiary, Reading-Sinram-Streat Coals, Inc., of the Bronx, N. Y., and Blue Ridge Fuel Co., Inc., New York, N. Y., for the acquisition by Blue Ridge of the business and assets of Reading-Sinram-Streat Coals. Lewis E. Iandoli, Blue Ridge president, joined Mr. Fox to say that the transaction would greatly benefit the sale and distribution of "Famous Reading Anthracite" in New York City.

Eastern Gas & Fuel Associates, Pittsburgh, Pa., has announced that it will reopen Eccles No. 5 mine, Eccles, W. Va. No opening date has been determined, but the company said it expected that operations would begin in the spring of 1956. Equipment deliveries would determine the actual date. The mine is expected to produce some 1,500 tpd in the Beckley seam and employ 125 men. It will be mechanized completely and will use loading machines and shuttle-cars to produce and transport coal underground. The coal will be transported to the surface through an existing hoist. In 1951 Eccles No. 5 produced 432,000 tons. In 1952 it produced 387,096 tons.

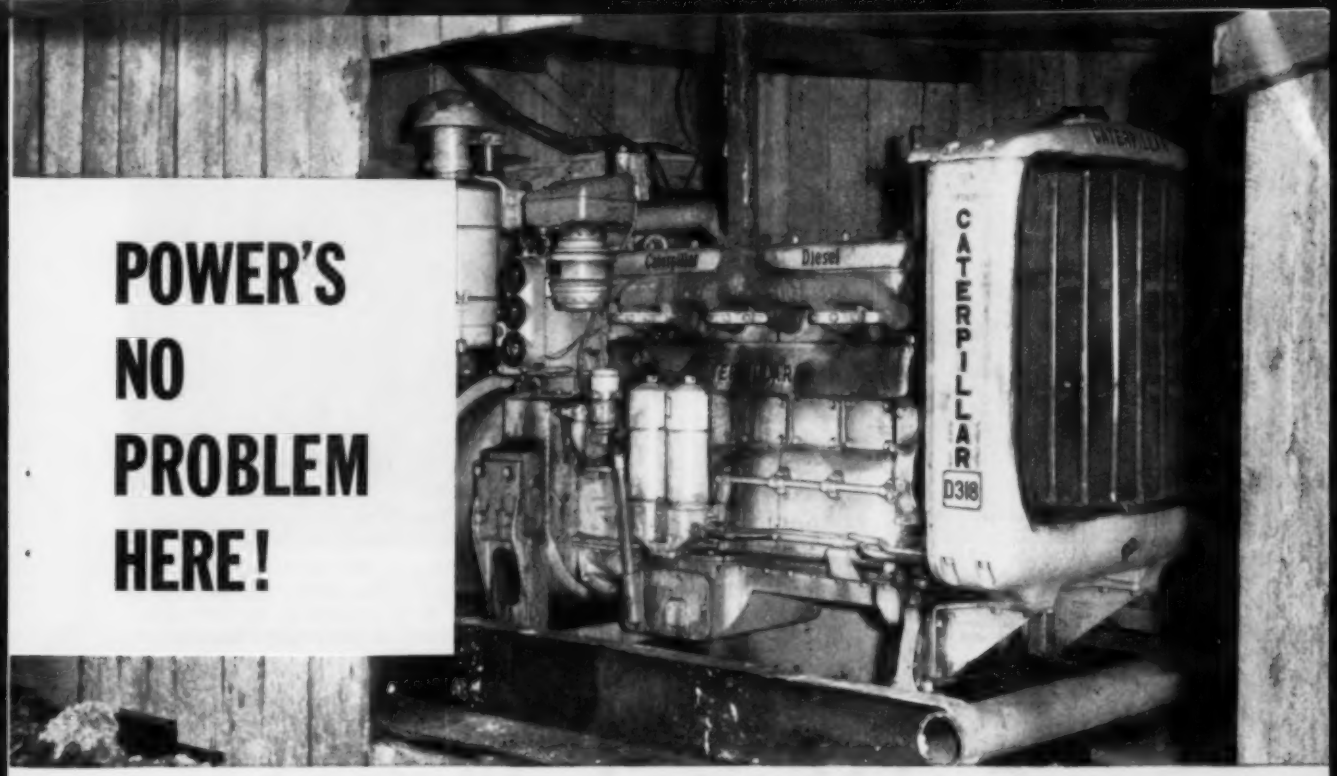
A few days before Christmas (Dec. 21) the Glen Alden Corp. announced it had completed arrangements to acquire the Ward LaFrance Truck Corp., Elmira, N.Y. No price was disclosed. Glen Alden said that the transaction would be financed out of cash and future earnings. Francis O. Case, president of Glen Alden, said Ward LaFrance will be operated as a subsidiary. The company manufactures fire apparatus and emergency rescue cars. Its annual business is reportedly $9,000,000. The new acquisition is another step in Glen Alden's plans to diversify its operations outside the anthracite industry. The Wilkes-Barre, Pa., Coal company acquired the Mathes Co., an air conditioning manufacturer earlier in 1955. Glen Alden earned $1,505,000 during the first nine months of 1955. During the same period in 1954 it reported a loss of $1,240,000.

Around The World

International discussion of the "critical position" of coal supplies in Britain and in the European Coal and Steel Community were being held in London last month. Representatives of the British Government, the High Authority of the Community and of the six governments that are members of the ECSC, together with marketing specialists, attended the meeting. The discussions centered on "restrictions in the coal trade between Britain and the Community." Britain has already said that she will cut her coal exports drastically this year. Other European countries, in turn, are expected to cut their supplies to Britain. The British also plan to raise coal export prices 30 to 40 shillings a ton this year. Observers believe this will put British prices up to the same levels as American delivered coal prices on the European continent.

The power of economy apparently has given coal a boost over the power of atomic energy for generation of electricity in Alberta, Canada. J. G. MacGregor, chairman of the Alberta Power Commission, has commented that "atomic energy is too expensive when we have so much unused coal in the ground." Mr. MacGregor added that Alberta likely will be one of the last Canadian provinces to develop commercial atomic power. He said that despite the "glamour" of atomic energy, it would not come to Alberta "until the cost is whittled down." Alberta's coal reserves are estimated at 46,000,000,000,000 tons underlying some 72,500 sq mi. Known available reserves in Alberta are enough for some 4,000 yr.

(Continued p 136)



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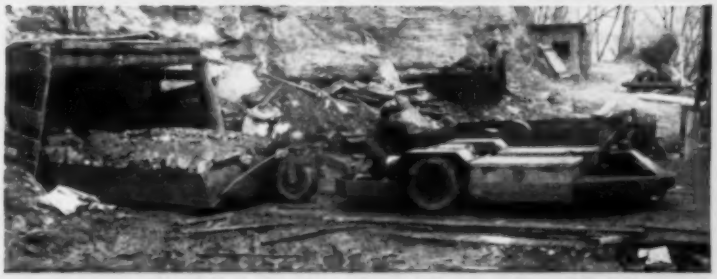

"I've never lost a minute due to engine failure," says Lewis Brant, a partner in Brant Coal Co. of Iaeger, W. Va. The Cat D318 shown here replaces another Caterpillar Electric Set. The company bought the larger, more powerful D318 on the basis of the previous set's dependable performance.

The D318 provides power for a five-HP fan, three 25-amp. chargers for 12-volt batteries used in coal hauling units, and cutting machinery. The mine has a 1000-ft. shaft, and produces 240 tons of coal daily in two eight-hour shifts.

Reliability and long life are important in continuous operation like this. And Caterpillar Electric Sets have both, with such features as aluminum alloy bearings, hardened crankshaft journals and cylinder liners, and effective oil and air filters.

Ease of operation is also important. Caterpillar Electric Sets are self-regulated and require no operating adjustments. These units incorporate Caterpillar's amazing new generator, which matches exactly the Cat Engine powering it. The new line of Caterpillar Electric Sets offers close voltage control from no load to full load, simplified starting, and more power in less space for easier installation.

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MODERN HEAVY-DUTY ELECTRIC SETS

H. L. SCOTT JR. (left), Norfolk & Western; W. P. Powers, Pa. Dept. of Mines, retiring president; and J. M. Lowe, Hillman Coal & Coke Co.

W. DAN WALKER (left), U. S. Bureau of Mines; C. W. Parisi, Pittsburgh Coal Co.; J. E. Boyle, U. S. Steel Corp.; J. T. Ryan Jr., Mine Safety Appliances Co.; C. E. Wissinger, National Mine Service Co.; R. R. Godard, U. S. Steel Corp.; B. H. Van Vactor, National Mine Service Co., and J. E. Lamont, Sterling Coal Co.

Over 500 coal men assemble in Pittsburgh for 69th annual meeting of . . .

Coal Mining Institute

Improved safety, more efficient operations, aggressive marketing and problems of securing trained supervisory and engineering personnel are major themes.

ADVANTAGES OF GOOD UNDERGROUND ILLUMINATION, dust control through proper cleanup and wet rockdusting, application of extensible conveyors and problems of securing trained personnel for mining were among major topics discussed at the 69th annual meeting of the Coal Mining Institute of America, at Pittsburgh, Pa., December 15-16.

Also included in the program were safety discussions centering on the 1955 campaign to reduce roof-fall accidents, the prevention of shuttle-car accidents and the use of a safety ground sentinel as a substitute for the third conductor in trailing cables.

At the opening business session Thursday morning, officers for the coming year were elected by the members as follows:

President—**J. T. Ryan Jr.**, president, Mine Safety Appliances Co., Pittsburgh.

Vice presidents—**J. A. Brookes**, general manager, Mather Collieries, Mather, Pa.; **D. C. Jones**, director, Mineral Industries Extension Services, Pennsylvania State University, University Park, Pa., and **H. C. Rose**, president, Pittsburgh Coal Co., Library, Pa. **J. M. Lowe**, cost accountant, Hillman Coal & Coke Co., Pittsburgh, was reelected secretary- treasurer.

In his report for the institute's vocational training committee, M. D. Cooper, director, mining engineering education, National Coal Association, called upon members of the institute to help educate the public concerning the availability of training opportunities for young men in high school and beyond. Mr. Cooper stressed the value of sponsoring trips to events like the American Mining Congress Coal Show for mining students.

There is a growing shortage in the number of competent men available to take over supervisory duties, Mr. Cooper warned. Furthermore, other industries are approaching mining-engineering students in colleges and are ahead of the coal industry in recruiting engineering talent.

Retiring president of the institute, **W. P. Powers**, mine inspector, Pennsylvania Dept. of Mines, Pittsburgh, noting that the prime purposes of the institute are to promote safety and efficiency in mining, commended the membership for its devotion and contributions along these lines. Safety has improved, Mr. Powers said, but continued pressure is yet needed.

Pointing out trends in coal markets, Mr. Powers took notice of the drop in the railroad-fuel fraction, but expressed con-

J. S. MATHEWS (left), Compass Coal Co.; Wayne D. Snell, U. S. Steel Corp.; J. A. Brookes, Mather Collieries; Irving Hartmann and John Nagy, U. S. Bureau of Mines, discussed wet rockdusting, continuous mining.

D. C. JONES (left), Penn State University; W. H. Tomlinson, Bureau of Mines; G. W. Stump, Rochester & Pittsburgh Coal Co.; J. S. Whittaker, Pittsburgh Coal Co., and J. D. Reilly, Hanna Coal Co., presented panel discussion on securing trained personnel.

fidence in the ability of Norfolk & Western's new coal-fired turbine locomotive to make coal a competitive railroad fuel. Bright spots for the future are seen in increased steel consumption and exports, but mainly in the growing demands from the utilities. Utility consumption in 1955 is expected to be 352% above what it was 20 yr ago in 1935.

Final event of the opening session was a description of his company's new coal-fired turbine locomotive (*Coal Age*, December, 1954, p 50) by **H. L. Scott Jr.**, mechanical inspector, motive power dept., Norfolk & Western Ry. Co., Roanoke, Va.

The locomotive, known as the 2300, is a steam power plant on wheels designed to burn this country's most plentiful fuel, coal, at a lower fuel cost per drawbar hp-hour than any other type of self-contained locomotive.

The locomotive unit alone weighs 818,000 lb in working order and measures 111 ft 7⅛ in over the couplers. The tender, carrying 22,000 gal of water and a Zeolite water softener, adds another 364,000 lb in weight and 49½ ft in length to make the overall length of 161 ft, 1½ in and the total weight 1,182,000 lb.

The principle of operation involves the burning of regular locomotive stoker grade coal in a water tube boiler to produce steam to drive a turbine. This turbine in turn drives two DC generators mounted on a common shaft. The electrical power produced by these generators is then used to drive the traction motors, which are geared to the axles, one motor to each of the 12 axles under the locomotive. Approximately 20 tons of coal are carried in the bunker immediately ahead of the operator's cab. This coal is conveyed by a stoker screw driven by a steam engine under the deck of the operator's cab and into the firebox. Steam jets are then employed to distribute the coal over the grate, Mr. Scott explained.

The locomotive was compared in the mountainous districts between Roanoke, Va., and Williamson, W. Va., with the Norfolk & Western Class Y6b, which is a 2-8-8-2 Mallet. In these mountainous districts the turbine locomotive was able to handle between 18 and 27% more tonnage than the Y7b. With this increased tonnage, the turbine's speed was 13% lower than the Y6b; however, the fuel savings realized by the 2300 varied from 19 to 37%, based on cost per ton-mile.

Comparisons between the turbine locomotive and the Norfolk & Western Class A, which is a 2-6-6-4 single-expansion articulated locomotive, were made on the flat district between Williamson, W. Va., and Portsmouth, Ohio, with both locomotives handling relatively the same tonnage. Fuel costs for the westbound movement of empty coal cars showed the turbine locomotive had a fuel saving of 29.9%. Movement of loaded coal cars from Williamson to Portsmouth show the turbine locomotive to have a fuel saving of 29.6%, based on cost per ton-mile.

As an experimental locomotive, the performance of the 2300 has been satisfactory, Mr. Scott reported. In fact, it has been better than most people expected. It has had a lot of headaches and it still has some. However, the purposes for which it was built are being fulfilled. The possibilities and the limitations of this type of locomotive are far better known than before it went into service. The locomotive now is assigned to regular pool service on the Radford Div., handling both time freight and coal trains between Roanoke and Bluefield. Its performance will be very carefully watched while further economic and design studies are being made.

Safety was the theme of the Thursday afternoon session, with speakers and subjects as follows:

James Westfield, assistant director, U. S. Bureau of Mines, Washington, cleaning up loose coal and dust; **B. H. Van Vactor**, chief engineer, National Mine Service Co., Beckley, W. Va., use of a safety ground sentinel as a substitute for the third conductor in trailing cables; **R. R. Godard**, electrical engineer, and **J. E. Boyle**, chief mine inspector, Frick District—Coal Operating Div., U. S. Steel Corp., Uniontown, Pa., improved underground illumination; and **C. William Parisi**, safety director, Pittsburgh Coal Co., Library, Pa., and **J. Earl Lamont**, safety director, Sterling Coal Co., Bakerton, Pa., shuttle-car safety. Mr. Ryan presided.

BETTER CLEAN-UP NEEDED

W. Dan Walker, supervisor, health and safety, District B, USBM, Pittsburgh, presented Mr. Westfield's paper, which pointed up a need for additional safeguards against the hazards of excessive loose coal and coal-dust deposits. Better cleanup as the faces advance, more effective dust-allaying equipment, and the development of dust collectors for use in face areas may go far in reducing the problems of coal dust in back and parallel entries to minor matters, Mr. Westfield said.

Noting that applicable statutes prohibit the accumulation of dust in dangerous quantities, the author pointed out that no quantitative definition of what constitutes a dangerous quantity has been written. In all instances, the Bureau attempts to arrive at a meeting of the minds as to what this quantity is, all things considered. Rapid increases in mechanization and results of investigations of recent explosions have focused attention on loose dust, leading the bureau to suggest the following remedies:

1. Greater attention should be given to increasing the effectiveness of dust-allaying equipment and dust-collection practices to prevent accumulations and alleviate the hazards of float dust.

2. In virtually all mines, a need is apparent for instituting and maintaining thorough cleanup of face areas. This may require some manual cleanup, with or following mechanical loading. Higher labor costs for cleanup may be recovered in material, labor and transportation costs for rockdusting.

3. More attention should be given to removing excessive accumulations of loose coal and dust in pillar work, and greater precautions should be taken in blasting stumps to facilitate caving in retreat mining.

4. In entries remote from active faces and connected by open crosscuts to haulageways, excessive accumulations should be leveled then covered with a good layer of rock dust.

5. Reducing the number of development entries in a multiple-entry system should be carefully considered. Limiting the number of entries would facilitate maintenance with respect to dust, thus reducing the hazard.

SAFER OFF-TRACK GROUNDING

Effective ground-fault protection for off-track equipment should provide reliable protection from shock hazards in the event of insulation failure or differences of potential between pieces of equipment, or equipment and ground, and protection against ignition hazards at the face, Mr. Van Vactor explained

in leading into a description of the Safety Ground Sentinel developed by National Mine Service Co. Mr. Van Vactor's co-author was C. E. Wissinger, electrical engineer, National Mine Service Co.

The Sentinel is a compact self-contained unit in a cast-steel explosionproof compartment 12½x7½x7¼ in. Electrical components consist of a ground-fault relay, a control-circuit relay, two selenium rectifiers to act as voltage check valves, a reset switch and a test switch connected in series with a resistor and a Thermistor. In normal use, the Sentinel employs the negative conductor in the two-conductor cable as a ground in limiting machine-frame potential to a maximum of 34 v and current to 42 milliamp. In adapting the unit to a grounded positive system, the only internal changes required are the reversal of the two rectifiers.

Based upon the present cost of cable, the cost of the Sentinel would be equivalent to the difference between the cost of 1,150 ft of No. 4 two-conductor cable with ground and 1,150 ft of two-conductor cable without ground, Mr. Van Vactor said. The longer life and lower maintenance cost of cable without a ground conductor promises appreciable savings, and field tests indicate that maintenance costs of the Sentinel are low. The unit successfully passed the explosion tests of the Bureau of Mines in June, 1954.

IMPROVED MINE LIGHTING

Pointing up the intentions of U. S. Steel to provide additional illumination underground in the interest of safety and increased efficiency, Mr. Godard listed the requirements of good lighting, either for haulage or face work, as (1) proper level of intensity, (2) uniformity of distribution, (3) absence of glare, (4) reasonable initial cost and (5) reasonable maintenance cost. Weight attached to each of these factors must be determined by the application.

For example, haulage lighting requires a relatively low level of illumination of extreme uniformity and complete absence of glare if the motorman is not to be blinded or safety hazards created through erratic distribution of light. In working sections, on the other hand, a relatively high level of glareless illumination is desirable. Along haulageways a level of perhaps ½ foot-candles may be suitable, but at the face a level of from 5 to 20 foot-candles may be desirable, Mr. Godard said.

These levels are far below industrial standards, but it must be remembered that intensity of illumination required for a man to perform any task is dependent upon the complexity of the task. There is no doubt that as mining machines become more complicated higher intensities will be needed which will more closely approach industrial standards, Mr. Godard declared.

Using slides to show various applications, Mr. Godard described the use of incandescent lamps and MSA fluorescent fixtures. Haulageway lighting using locomotive headlight lamps on 550 v varied in initial cost from 7c per ft to 20c per ft, depending upon the control and protective equipment required in different applications.

Lamps for section lighting must be permissible. On this score, USBM tests show that fluorescent lamps with instant-start circuits are intrinsically safe. In DC-powered mines, AC for lighting may be obtained from small m-g sets or from static frequency inverters employing grid-controlled mercury-vapor tubes operated from the DC trolley system, Mr. Godard explained.

Continuing the illumination theme, Mr. Boyle traced the history of development of underground lighting and the direct bearing of good illumination on safety. In an actual demonstration, the relative intensities of flame safety lamps, oil and carbide cap lamps were compared with a modern electric cap lamp and the new fluorescent fixture, showing the vast improvement over the years.

"Pursuing this course to its ultimate conclusion will give coal miners the advantage of the best possible illumination," Mr. Boyle stated, "giving us equal opportunity to become competitive accidentwise with the best of other industries." In support of this, Mr. Boyle pointed out that accident experience in underground working places in which adequate illumination is provided compares favorably with that of U. S. Steel's outside shops. In the well-lighted Robena mine motor barn, for example, no lost-time accidents have occurred in the past 10 yr.

SAFE SHUTTLE-CAR HAULAGE

In the two-paper presentation on shuttle-car safety, Mr. Parisi confined his remarks to operations in high coal and Mr. Lamont to operations in low coal.

Noting that the injury-frequency rate in shuttle-car accidents is approximately twice that of all other bituminous mining accidents, Mr. Parisi reported on a number of actual accidents in the hope that the knowledge of how they occurred might be helpful in preventing similar incidents in the future.

Among major causes were:

1. Insufficient clearance at sides.
2. Operators not facing direction of travel.
3. Defects in control equipment.
4. Brake failures and skidding.
5. Inexperience of operators.
6. Obstructed operator vision.

In an effort to reduce such accidents, Mr. Parisi advocated that operators be trained to face the direction of travel at all times, that cars be operated from a seated position, that a gong or warning be sounded when approaching turns or other obstructions, that no one be permitted to stand along the rib while a car is passing, that only trained persons operate shuttle cars, that no one be allowed to ride in the car and the cars be properly maintained.

One of the most important factors is the proper selection and training of shuttle-car operators. And equipment manufacturers can be of great help by designing cabs to give more protection to the operator. On the whole, though, the responsibility is management's, Mr. Parisi concluded, since only management can provide operator training, give effective supervision, correct hazardous conditions, provide good maintenance and instill safe work habits.

Turning to similar problems in low-coal mines, Mr. Lamont supported the recommendations of Mr. Parisi while stressing the important role of the immediate supervisor in preventing shuttle-car accidents.

Accidents resulting from unsafe practices are a definite challenge to the supervisor. Hard and fast rules against bad practices should be set up and enforced. For example, there has been much discussion on how far an operator should be permitted to move his car without turning around, Mr. Lamont pointed out. At his company's operations, such over-the-shoulder operation is absolutely taboo, and both supervisors and operators know it.

The practice of unauthorized operators in the cab should not be too difficult to overcome with strict rules and sincere education. Greatest possible clearance, consistent with seam conditions, should be provided, and mining plans may be formulated with shuttle-car safety foremost in mind, other things being equal.

Mr. Lamont pointed out in conclusion that in 7 yr of shuttle-car experience at his company's mines, only two lost-time accidents have occurred. Definite rules and strict enforcement of these rules receive much of the credit for this record.

AGGRESSIVE MERCHANDISING

Principal speaker at the institute's annual banquet Thursday evening was W. W. Bayfield, executive vice president, American Coal Sales Association, Washington, D. C. Toastmaster was James C. Gray, vice president—operations, coal operating div., U. S. Steel Corp., Pittsburgh.

Is the coal industry in charge of its own future? That was the question propounded by Mr. Bayfield. The answer can be affirmative if coal adopts a four-point formula, including striving to produce a better product at lower price; aggressively and intelligently developing new markets while protecting existing ones; creating a healthy attitude for coal by dispelling in the public mind the false doctrine that coal is an old-fashioned fuel; and developing burning equipment which meets the desires and needs of consumers and potential consumers.

In laying out procedures and suggestions for achieving these objectives, Mr. Bayfield noted that the industry already is doing a heartening job of increasing production efficiency and recognizing the problems that must be solved to insure efficient operation in the future.

On market development, however, coal must exert itself to prevent conversion of present consumers to competitive fuels, obtain new business in thousands of plants, schools and residences, and promote conversion of consumers of other fuels to coal. Thorough market research is indispensable in these activities, Mr. Bayfield pointed out.

Speaking of coal's public relations, Mr. Bayfield said the industry is confronted with the task of educating or re-educating all but a small percentage of 160

million people, a formidable assignment, but one which our competitors have accomplished with considerable success. Research and development in burning equipment must continue even though progress in this line is now evident.

Coal can be the architect of its own future, Mr. Bayfield declared, if it is willing to invest time, effort and money in market research, public relations and utilization studies.

Roof safety, in-cycle rockdusting, and operations with an extensible conveyor were highlight topics of the Friday morning session. With Mr. Brookes presiding, the program featured Lewis E. Evans, deputy secretary, Pennsylvania Dept. of Mines, Ebensburg, Pa., speaking on the 1955 campaign to reduce roof-fall accidents; Wayne D. Snell, assistant director, mine inspection, U. S. Steel Corp., Pittsburgh, on the use of wet rock dust in the continuous-mining cycle; Irving Hartmann, chief, Branch of Dust Explosions, USBM, Pittsburgh, on explosion-prevention by wet rockdusting and other measures, and J. S. Mathews, division superintendent, Compass Coal Co., Clarksburg, W. Va., on an application of extensible belt conveyors in continuous mining.

PREVENTING ROOF-FALL INJURIES

At the direction of Secretary Joseph Kennedy, all Pennsylvania mine inspectors since February, 1955, have investigated all lost-time roof-fall accidents in their districts. Investigations of serious accidents are handled as those for fatalities and less serious accidents are investigated as soon as possible. Complete reports of these investigations are assembled in the Department of Mines to permit studies of causes to be made in the hope of leading to solutions to the problem, Mr. Evans related.

Statistics show that the assault on roof-fall accidents in Pennsylvania is paying off. In the 6-yr period, 1949-54, tons per roof-fall fatality averaged 2,028,257. Improved performance in the first 8 mo of 1955 shows a rate of one roof-fall fatality for every 3,479,132 tons produced in Pennsylvania bituminous. This is an increase of about 300,000 tons per fatality over 1954, Mr. Evans reported.

One-third of the accidents occurred in the single hour from 1:00 to 2:00 P. M., leading observers to consider whether men and officials experience a let-down at this time of day. Two-thirds of all roof-fall fatalities occurred in high coal with these mines producing about 60% of Pennsylvania's bituminous coal. Roof-fall fatalities in mines employing from 5 to 15 men accounted for 25% of the total, although these mines contribute only about 5% of total production. Apparently much remains to be done in these smaller mines, Mr. Evans declared. Upwards of 80% of all roof-fall fatalities occur in the immediate face area, calling for diligent preventive measures in this area.

Listing major causes, and attaching relative weight to these causes, Mr. Evans pointed out that poor supervision, hazards of the industry, pure accident, and human failures of victims and supervisors show up most often on the reports, although hazards of the industry and pure accident are uncommon.

The solutions, Mr. Evans said, are roof-control measures which can keep pace with today's production methods, top-flight supervision and safety education.

USING WET ROCK DUST

Mr. Snell's paper describing U. S. Steel methods of applying wet rock dust appears in full in this issue beginning on p 62.

In reporting on his continuing studies of explosion prevention through wet rockdusting with his colleague and co-author, John Nagy, chief of the Bureau's mine experiments section, Dr. Hartmann said that protection against explosions near rapidly advancing faces can be achieved without undue difficulty by (1) applying wetted rock dust on rib and roof surfaces, (2) placing dry rock dust on light, overhead cross shelves or (3) providing light transverse water troughs overhead. In all instances the coal dust on the floor must be neutralized by rock dust which can be distributed with shovels without forming dust clouds.

Where extensible conveyors are used with continuous mining machines, they should be accompanied by the overhead shelves on which rock dust can be placed. In entries where wet rock dust has been applied a close check should be maintained to determine when the openings should be redusted, Dr. Hartmann warned. It should be noted when excessive spalling takes place and when appreciable float dust has accumulated. The practice of applying a little rock dust at frequent intervals is a good one.

Furthermore, the effectiveness of all explosion-prevention measures will be greatly increased if every effort is made to reduce the formation of fine dust during mining, to collect or promote the settling of dust near the point of formation and to remove excessive accumulations from entries.

"CONTINUOUS" CONVEYING

Winding up the Friday morning session with the assertion that the combined use of continuous miners and extensible belt conveyors forms the nearest approach to real continuous mining, Mr. Mathews described operations at Compass No. 1 mine (*Coal Age*, July, 1955, p 50) where 7½-man crews using these machines produce an average of 562 tons per shift, based upon records for 35 recent shifts.

Recovery is averaging about 92% from a system employing entries on 60-ft centers with 100-ft crosscut centers. In driving two headings the intermediate equipment of the extensible conveyor is left intact in its own heading. Only the head and tail sections are moved back and forth with the miner in moves that consume only about 40 min. The mining assembly also includes a 20-ft bridge conveyor which permits the miner to reach farther through pillars in recovering them and reduces slabbing of the pillar to a minimum to afford positive roof control while pillaring.

The crew includes two roof-bolters, each operating a side-mounted drill on the continuous miner. A bolt is installed at each 18-in advance of the machine, alternately on the two sides, Mr. Mathews explained. Intake air is carried into the section over the extensible belt. The belt itself is fire-resistant neoprene and special permission has been obtained from the West Virginia Dept. of Mines to handle the air this way.

The crew includes a foreman, who spends all of his time at or near the face; a continuous-miner operator, a mechanic, two roof-bolters, two utility men and half the time of a night-shift mechanic.

The extensible belt is operated at 445 fpm and the bridge conveyor at 485 fpm. One of the big advantages of the extensible unit at Compass is that troubles with soft bottom are virtually eliminated, as is the cost of maintaining roadway that would be required with off-track equipment, Mr. Mathews concluded.

The final session on Friday afternoon featured a panel discussion on the problems of securing trained personnel for the mining industry in the future. Chairman Mr. Jones, and panel members were: **J. D. Reilly,** vice president, Hanna Coal Co., St. Clairsville, Ohio; **J. S. Whittaker,** general superintendent, Pittsburgh Coal Co., Library, Pa.; **G. W. Stump,** assistant production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa.; and **W. H. Tomlinson,** training administration officer, U. S. Bureau of Mines, Pittsburgh.

GETTING TRAINED MEN

On the subject of acquiring top management and engineering personnel for the coal industry, Mr. Reilly pointed out a paradox in our mining-engineering education situation. It is that while enrollment is dropping and one school (Lafayette) is abandoning its mining instruction, the industry for the first time in years shows a solid growth potential in which the services of more and more engineers will be needed. We will need all the engineers our colleges can provide, plus any engineering talent that can be developed through other forms of instruction, Mr. Reilly declared.

One remedial step is to glamorize the industry more than in the past. Coal has more to offer the young engineer than the petroleum industry and it soon will be in a position to match dollar for dollar with them in competing for engineering talent. Noting that coal men have been reluctant to actively recruit young men during the recent slowdown in the industry, Mr. Reilly stressed that all this has changed in view of the better future now opening up.

As to what the engineer should be, Mr. Reilly pointed out he must have the ability to balance purely technical considerations against the human factors involved in a big job like coal mining. He must be able to get more out of a dollar of invested capital and he must have a sincere interest in designing and operating with low cost in mind.

Turning to the role of coal's leaders in this recruiting program, Mr. Reilly

(*Continued on p 138*)

JOY Safety Circuit Centers (S.C.C. units) are the Mining Industry's most inexpensive insurance against the damages that electrical overloads, shorts and ground leaks inflict on men, machines and trailing cable. Supplied with one through four power feeder outlets, in a wide variety of A.C. or D.C. ratings to match both low and high vein mining requirements.

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- **External arms reset breakers, turn current off and on**
- **Safety ground trip provides insulation failure protection**
- **ISC Circuit (*) permits approved cable sectionalization**

Note: Explosion-tested designs have been approved for use in gaseous atmosphere by the U. S. Bureau of Mines and they stay permissible in operation; i.e., no protective covers or fuses must be removed or replaced. Simple movement of outside breaker control handle restores protected power to machinery after fault has been corrected. (*)*ISC Circuit is optional on all designs.*

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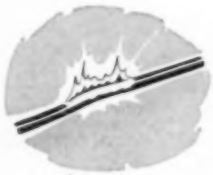

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Personal Notes

JESSE F. CORE

M. B. GIROD

Core, Girod Lead Flurry Of Frick District Boosts

A day after it appointed chief engineer **Jesse F. Core** to general superintendent of the Frick Dist. mines (Dec. 1), U. S. Steel's Coal Div. followed with the dual announcement that (1) Robena mine, Greensboro, Pa., would become three mines (Nos. 1, 2, and 3) and that (2) **M. B. Girod,** superintendent of Robena, had been appointed assistant general superintendent of the Frick Dist.

With the three-way division of Robena, the Coal Div. of U. S. Steel upgraded three more men by making them superintendents of the newly created trio of mines.

Robert Jordan, superintendent of the Bridgeport Mine, Brownsville, Pa., took over Robena No. 1; **J. P. Flynn,** superintendent of Palmer Mine, Adah, Pa., moved to Robena, No. 2; and **J. W. Boyle,** formerly superintendent of National Mine No. 3, Muse, Pa. (closed), was appointed superintendent of Robena No. 3.

To fill the gaps created by the Robena reorganization, U. S. Steel announced these promotions: **August R. Werft,** an assistant general superintendent, to succeed Mr. Core in his old post as chief engineer of the Frick District; **D. H. Bayard,** an assistant superintendent at Robena to succeed Mr. Flynn as superintendent at Palmer Mine; **L. J. Callaghan,** formerly a superintendent at Ronco Mine, Masontown, Pa., to succeed Mr. Jordan at Bridgeport Mine.

Mr. Core worked for four leading coal companies before he joined U. S. Steel. In 1935 he was employed by the Hillman Coal & Coke Co. as a miner. Three years later he joined Pittsburgh Consolidation Coal Co., serving in various capacities. He became chief engineer at Nemacolin mine, Buckeye Coal Co., in 1947, then moved to Island Creek Coal Co., Holden, W. Va., in 1950. He joined U. S. Steel in 1951.

Mr. Girod's career in coal began in 1912, when he was employed as a chainman by the H. C. Frick Coke Co. By 1929 he had become assistant mine boss at Leckrone. Shifted to Footedale and Filbert in 1929 as mine foreman, he became superintendent of Filbert in 1938. In 1948 he was appointed superintendent.

John J. Forbes Retires

John J. Forbes, director of the Bureau of Mines, retired Nov. 30 after 40 yr of federal service, four of them as director. At a Washington ceremony in the office of Secretary of the Interior Douglas McKay, the Secretary cited Mr. Forbes as a "man who has dedicated his entire working life to the conservation and betterment of priceless human life."

Mr. Forbes has earned this sort of praise before. In 1941, for instance, some 1,000,000 miners completed first aid courses in a safety program under his supervision. Only last November the USBM reported that all the miners in United Mine Workers District 4 (Pennsylvania) had completed courses in safety training. Both instances document a single, career-length effort by Mr. Forbes to insure safety in the nation's mines.

Mr. Forbes launched his 60 yrs in mining back in 1895 when he began working as a breaker boy in Pennsylvania's anthracite region.

He joined the USBM in 1915 as a first-aid miner and served in several capacities in Pennsylvania and Ohio coal mines. In the next 12 yrs he advanced from foreman miner to principal mining engineer. In 1927 he was appointed supervising engineer of the Safety Div., Pittsburgh, Pa. In 1941 he was appointed chief mine inspector until, in 1942, he was called to Washington to administer the Mineral Production Security Div. As administrator he supervised emergency functions devised by the USBM to insure war materials production.

With the conclusion of World War II and the expiration of the program, Mr. Forbes was advanced to assistant chief of the Health and Safety Branch, assuming supervision of the Coal Mine Inspection Div. He was appointed USBM director in 1951.

Osmanski At Island Creek

J. E. Osmanski, university professor of industrial psychology (Penn State) and former industrial personnel director

(Crucible Steel), has been appointed manager of personnel at Island Creek Coal Co., Huntington, W. Va. Mr. Osmanski will be responsible for executive and technical recruitment, management of training and development, salary administration and personnel policies, according to J. L. Hamilton, vice president in charge of Island Creek operations. Mr. Osmanski specialized in personnel and psychological training at Stanford University and at the University of Chicago.

The United States Bureau of Mines has appointed T. Reed Scollon chief of its Division of Bituminous Coal. Mr. Scollon will direct the Bureau's technical and economic research, and programs connected with bituminous coal and lignite, explosives and air and stream pollution. The position is somewhat similar to one announced in October when the USBM created a Division of Anthracite and established Joseph A. Corgan as its chief.

Mr. Scollon has served as mining engineer for the Bituminous Coal Producers' Board, District No. 1, Altoona, Pa. and as director of research and statistics for the Central Pennsylvania Coal Producers' Association at Altoona. He moved to Washington in 1951 to head the Coal Sec. of the Office of Price Stabilization.

Dr. Charles E. Lawall, assistant vice president of coal traffic and development for the Chesapeake & Ohio Railway, Huntington, W. Va., has been appointed assistant to the president for coal traffic and development. Dr. Lawall succeeds the late J. W. Bahen. A former president of West Virginia University, Dr. Lawall joined the C&O in 1945 as engineer of coal properties. In 1947 he was appointed an assistant vice president.

Dewitt C. Snyder, New York, has been elected president of Sterling Smokeless Coal Co., Whitby, W. Va., and Mt. Hope Coal Co., Holcomb, W. Va. Mr. Snyder succeeds his father, the late Thomas H. Snyder, in the dual posts. The boards of both companies have also elected Paul Q. Warden, Whitby, W. Va., vice president and general manager.

Allen Pack has succeeded T. R. Blankenship as superintendent of the Stephenson, W. Va., mine, Buckeye Coal & Coke Co.

R. E. Salvati, president of the Island Creek Coal Co., was re-elected a vice president of the American Mining Congress last month during the annual membership meeting in New York, Dec. 5. C. J. Potter, president of the Rochester & Pittsburgh Coal Co., and L. Russell Kelce, president of the Sinclair Coal Co., were elected to director's posts. L. C. Campbell, vice president of Eastern Gas & Fuel Associates and president of the National Coal Association, was returned to the chair of AMC's coal division.

George W. McCaa has been appointed general manager of the Hanna Coal Co., subsidiary of Pittsburgh Consolidation. He has been assigned to develop a new Hanna mine near Cresap, W. Va. Mr. McCaa was general manager of the Jamison Coal & Coke Co. until it was bought in 1954 by Pittsburgh Consolidation.

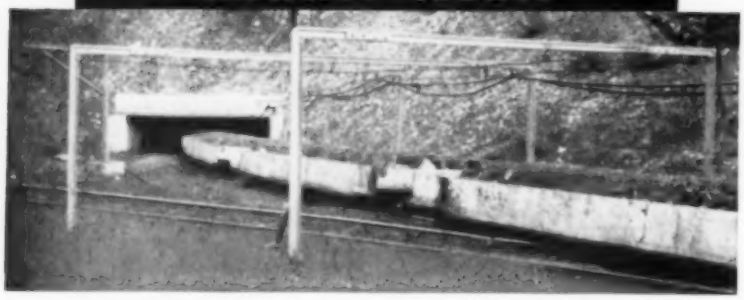
Frederic W. Hammesfahr has been appointed assistant to the vice president of development, Pittsburgh Consolidation Coal Co. announced last month. Mr. Hammesfahr had been manager of the process development section of General Electric's Metallurgical & Chemical Div. In his new post he will analyze, develop and exploit chemical opportunities for Pitt Consol.

MEETINGS

American Institute of Mining Engineers; Annual Meeting, Feb. 20-23, Hotels New Yorker and Statler, New York, N.Y.

Rocky Mountain Coal Mining Institute; 52d Regular Meeting, June 17-20, Hotel Colorado, Glenwood Springs, Colo.

CAPACITY COUNTS



These two views at the Princess Elkorn No. 1 Mine, David, Kentucky, show clearly the low height operating conditions within the mine. Differential's 24" (high) cars are really loaded — and crown-scraped — as they approach the rotary dumper (also Differential).

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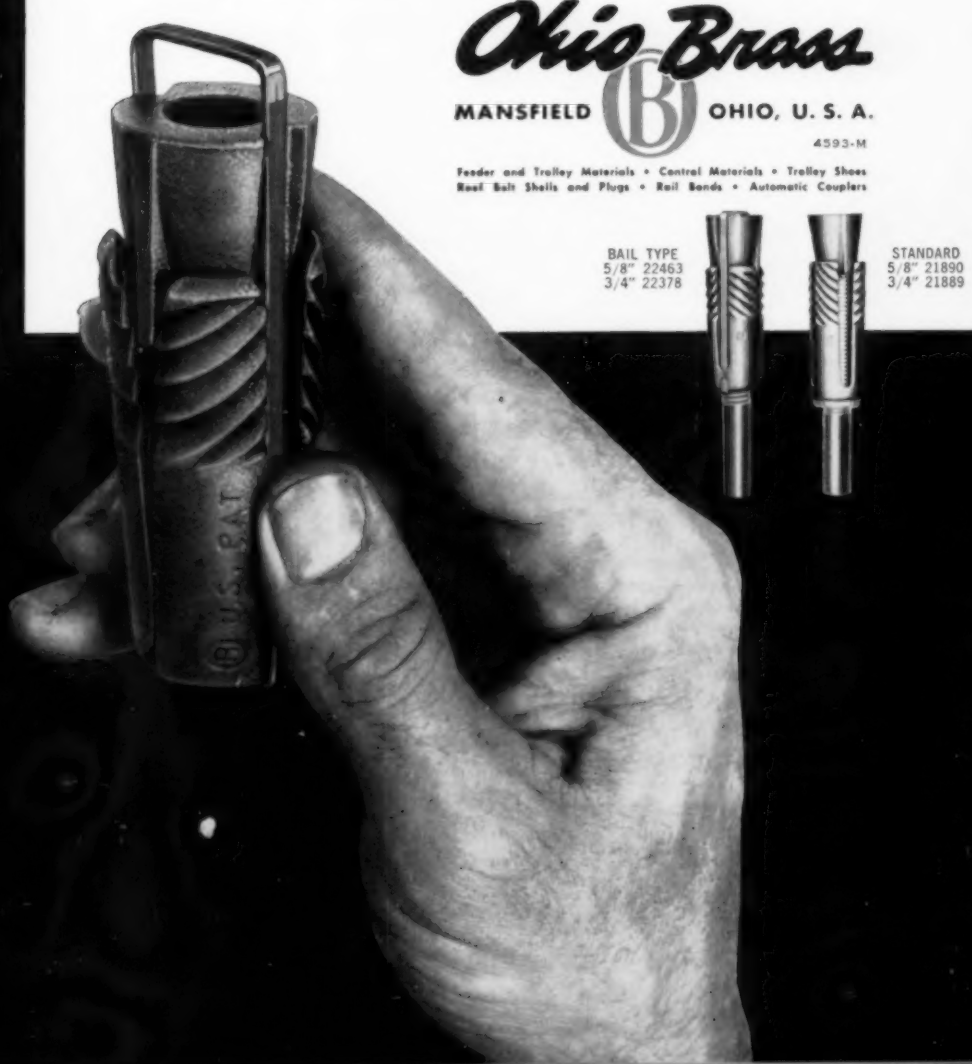

BAIL TYPE
5/8" 22463
3/4" 22378

STANDARD
5/8" 21890
3/4" 21889

Association Activities

Appalachian Officers Elected

These officers, directors and committee members were elected at the annual meeting of the Southern Appalachian Coal Operators Association, in Knoxville, Tenn., Nov. 25, 1955.

Officers: **C. R. Griffith,** president; **W. S. Webster,** first vice president; **Fred Loving Jr,** alternate vice president; **J. O. Archer,** second vice president; **H. S. Homan,** executive secretary and treasurer.

Directors: **R. H. Hughes,** Clinchfield Coal Corp.; **Ray S. Walker,** Laddie Coal & Mining Co.; **L. M. Rayburn,** Blue Diamond Coal Co; **H. D. Faust,** Southern Collieries, Inc; **C. R. Griffith,** Southern Coal & Coke Co; **W. C. Hutcheson,** Wind Rock Coal & Coke Co; (**Warren Haydon,** alternate); **E. F. Wright,** Clinchfield Coal Corp; **Fred Loving Jr.,** New Jellico Coal Co; **A. R. Matthews,** Pocahontas Fuel Co; **C. J. Potter,** Rochester & Pittsburgh Coal Co; **J. O. Archer,** Blue Diamond Coal Co; **W. T. Ray,** Meadow Creek Coal Co.

Executive Committee: **C. R. Griffith,** chairman; **W. C. Hutcheson (Warren Haydon,** alternate); **Fred Loving Jr; E. F. Wright; W. T. Ray.**

Legislative Committee: **Lindsay Young, W. T. Ray, J. O. Archer.**

Directors to Southern Coal Producers' Association: **W. T. Ray, H. S. Homan.**

Director to Kentucky Coal Association: **John Mayhew.**

Member for Smoke Abatement and for Tennessee Taxpayers' Association, **H. S. Homan.**

Joint Board of Arbitration: **J. O. Archer, Fred Loving Jr, Hugh Faust,** alternate.

Deaton Trent, formerly with Hercules Powder Co., has joined the Carboloy Dept., General Electric Co., Detroit, Mich., as a representative in the coal mining field. Mr. Trent, who makes his headquarters in Harlan, Ky., will service coal producing areas of eastern Kentucky, Virginia and Tennessee.

Finley H. Davis, Lexington, Ky., has been re-elected president of the Hazard Coal Operators' Association. Other officers: L. A. Hopper, vice president; Fred B. Bullard, secretary-treasurer.

Joseph E. Moody has been re-elected president of the Southern Coal Producers' Association. Also re-elected: Walter R. Thurmond, secretary; Laurence E. Tierney Jr., treasurer.

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Connellsville Electric - Automatic Man Cages

- Fully Automatic
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Obituaries

Robert Hartley Sherwood, president of Sherwood-Templeton Coal Co. and board chairman of the Stonefort Corp., Indianapolis, Ind., died Dec. 2. He was 79. A strip miner since 1912, Mr. Sherwood was noted for his improvements in coal mining and preparation techniques. He was formally recognized for his research leadership in 1953 when he was presented with the first annual award of Bituminous Coal Research, Inc. Mr. Sherwood was graduated from Brooklyn Polytechnic Institute with a degree in electrical engineering, later won his Master's degree at Cornell. A member

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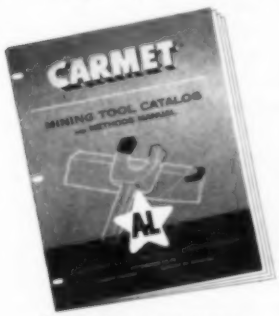
Carbon Transfer & Supply Co., Helper, Utah
Johnson Supply Co., Denver, Colorado



Write for your copy

This informative 16-page booklet gives complete data, sizes, etc. on all styles of Carmet carbide-tipped cutter and drill bits. Also included is a valuable methods manual on reconditioning methods and equipment. Gladly sent free on request.

ADDRESS DEPT. CA-73

The unequalled range of selection that is available to you in Carmet carbide-tipped coal cutter and drill bits simply means this: that you can match up your bits just that much more closely with the actual conditions you have!

And *that* means you can profit by the greatest increase in cutting speed and tons cut per bit setting—the greatest reduction in down time and in over-all bit cost per ton—that is possible for you to secure *anywhere* with carbide bits. What's more, you have added assurance of top efficiency in the overlaying cap of steel that *double-bonds* the carbide tip of each Carmet cutter bit firmly in its seat. That's a feature which Carmet *originated*. It operates to protect you against tip loss, and to permit cutting on both sides as well as in front—eliminating side drag, reducing power consumption, etc.

Even the shank steel in Carmet carbide bits is a product of quality control: tough enough to insure against bending or breakage, yet of a hardness to permit set screw locking. ● Just *try* Carmet bits—see for yourself what they'll do! We'll be glad to cooperate with you in proving their advantages in your operation . . . see your distributor (left) about a test order. ***Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Mich.***

The Original DOUBLE-BONDED Carbide Bit

CARMET® AL

W&D 54128

of the BCR board of directors since its establishment in 1934, Mr. Sherwood became its interim president in 1950.

Thomas H. Snyder, president of Sterling Smokeless Coal Co. and the Mt. Hope Coal Co., died in Mt. Hope, W. Va., Nov. 14. He was 72. Mr. Snyder was born in Glenco, W. Va. He had been active in the coal industry since 1900. A son, Dewitt Snyder, is vice president of C. H. Sprague & Son Co., New York, N. Y.

Samuel J. Craighead, 57, retired vice president and general manager of the United States Fuel Co., Utah, died of a heart ailment Nov. 16 in Salt Lake City. Mr. Craighead moved to Utah 7 yr. ago from Uniontown, Pa., where he had been employed by H. C. Frick, subsidiary of U. S. Steel. In Pennsylvania he directed operations of the Robena mine.

William S. Speed, for many years head of the Louisville Cement Co. and chairman of the board of the Black Star Coal Co., died Dec. 8 at his home in Louisville, Ky. He was 82. Mr. Speed was also associated with the Pioneer Coal Co. and the Beaver Dam Coal Co. He was the son of the founder of the J B. Speed interests and had been active in the management of the companies until some 10 days prior to his death.

Harry McCrorie Johnstone, retired general manager of Gorgas Mine, Alabama Power Co., died in Jasper, Ala., Nov. 29, after a heart attack. Before joining Alabama Power, Mr. Johnstone had been with Jagger Coal Mines, Galloway Coal Co. and Republic Steel.

One STAMLER Car Spotter usually sells another one, but

This One Sold 25 More!

1952	1	Car Spotter
1952	5	Car Spotters
1953	8	" "
1954	5	" "
1955	7	" "
	26	In Use by One Mining Company

Do Stamler Car Spotters increase tonnage and reduce costs? Are they a sound investment? *Let's look at the record of our sales to one mining company for the answers.* In 1952 they bought their first Stamler Car Spotter and gave it a trial. As a result, they ordered five more that same year! And they have continued to re-order: — eight in 1953, five in 1954 and seven in 1955! So *you can see that our first sale to this efficient, cost-conscious company has resulted in 25 more sales!* How's that for proof of the production-increasing, dependable performance of Stamler Car Spotters? *When are YOU going to try your first Stamler equipment?*

STAMLER LOADING POINT EQUIPMENT

W. R. STAMLER CORP. PARIS KENTUCKY

SCHROEDER BROS., Exclusive Eastern Sales Agent, PITTSBURGH, PA.
UNION INDUSTRIAL CORP., CARLSBAD, NEW MEXICO
SALMON & CO., BIRMINGHAM, ALABAMA

EQUIPMENT APPROVALS

Six approvals of permissible equipment were issued by the U.S. Bureau of Mines in November, as follows:

Goodman Mfg. Co.—Type 403 miner; four motors, one 100 hp, one 25 hp and two 10 hp, 250 v, DC. Approval 2-1104; Nov. 4.

Joy Mfg. Co.—Types 10SC12PE/PXE-1 shuttle car; five motors, two 7½ hp and three 15 hp, 250 v, DC. Approval 2-1084; Nov. 7.

Joy Mfg. Co.—Type 1CM4E continuous miner; seven motors, four 7½ hp, one 15 hp and two 100 hp, 250 v, DC. Approval 2-1105; Nov. 17.

Goodman Mfg. Co.—Type 580-10 shuttle car; three motors, two 15 hp and one 10 hp, 250 v, DC. Approval 2-1106; Nov. 21.

Wilcox Mfg. Co.—Wilcox miner; three motors, one 50 hp and two 5 hp, 250 v, DC. Approval 2-1107; Nov. 22.

J. H. Fletcher & Co.—Type DAF14-RH-C2-S2-R2-roof drill; one 25 hp, 220/440 v, AC motor. Approvals 2-1108 and 2-1108A; Nov. 25.

In addition, the USBM issued acceptance designations to cover certain belts that have met the requirements of Schedule 28 concerning fire-resistant qualities.

Scandinavia Belting Co.—Scandura-Yellow Line; cover material, PVC; acceptance designation, USBM 28-1; Nov. 16.

Hewitt-Robins, Inc.—Monarch C/R 40, 50, 70; cover material, chloroprene rubber; acceptance designation, USBM 28-2; Nov. 21.

Goodyear Tire & Rubber Co.—Coal Flo 28-oz, 42-oz and heavy rayon; cover material, chloroprene rubber; acceptance designation, USBM 28-3; Nov. 25.

Republic Rubber Div., Lee Tire & Rubber Corp.—Super Excelo Reprene; cover material, chloroprene rubber; acceptance designation, USBM 28-4; Nov. 25.

FAST!

that's the word for Bucyrus-Erie dig-swing-dump cycle

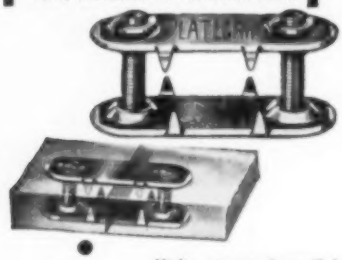
High-speed performance in Bucyrus-Erie excavators doesn't depend entirely on super-skilled operators or ideal digging conditions. It's the result, too, of engineering that offers features like these: anti-friction bearings to smooth the path of power . . . fast-acting controls that are pinpoint accurate and easy to operate . . . big, generously-designed clutches and brakes that deliver instant response with an extra margin of safety . . . strong, lightweight front end that puts power to work swinging payload, not deadweight . . . wide, ground-hugging treads with large bearing area for the kind of stability that makes rapid operation possible.

With all their speed of operation, Bucyrus-Erie excavators still deliver long life and low maintenance. Mining and quarry men have learned to depend on Bucyrus-Erie machines—from ⅜ to 4-yd.—for efficient, low-cost production. See your nearby distributor soon for complete details. 122E55

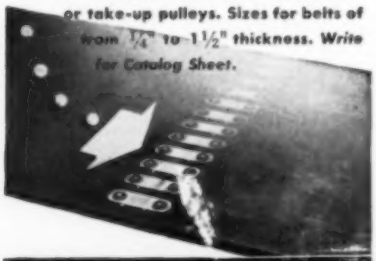
BUCYRUS ERIE
South Milwaukee Wisconsin

75 YEARS OF SERVICE to Men Who Shape the Earth

PLATEGRIP
PLATE FASTENERS FOR CONVEYOR BELTS



Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from ¼" to 1½" thickness. *Write for Catalog Sheet.*



ARMSTRONG BRAY & CO.
5311 Northwest Highway, CHICAGO 30, U. S. A.

Among the Manufacturers

Clark Equipment Co. has awarded contracts for construction of a 125,000-sq ft addition to its Construction Machinery Div., Benton Harbor, Mich. The company made the first announcement of an addition last November when it was dedicating a newly built administrative building in Benton Harbor. The proposed new wing will house tractor assembly lines. Clark's original Benton Harbor plant was opened in 1954 to manufacture "Michigan" tractor shovels, excavator cranes and dozers. Unforeseen sales volume (some $32,000,000 in 1955) forced Clark to expand more rapidly than it had anticipated.

Henry Disston & Sons, Inc., has been acquired by H. K. Porter Co., Inc., Pittsburgh, Pa., for $6,000,000 of its new 4¼% preferred stock. Porter also has acquired Carlson & Sullivan Inc., Monrovia, Calif., manufacturers of steel rules and measures. No price was disclosed. Carlson & Sullivan will operate as a part of the new Henry Disston Div., H. K. Porter Co., Inc. Lawrence L. Garber, a vice president, was made general manager of the division. He had been general manager of Porter's Alloy Metal Wire Div., Prospect Park, Pa. The main Disston plant is on a 65-acre site along the Delaware river. Disston owns five subsidiaries (Great Britain, Washington, Toronto, Wisconsin, Australia). It also has plants in Sydney, Toronto, Vancouver, Chicago and Seattle.

Canton Stoker Corp., Canton, Ohio, has bought the assets of Wagener Steam Pump Co., Canton, for an undisclosed sum. The Wagener company has manufactured piston-type steam and power pumps for 69 yr. Production will be carried on under the name Wagener-Schrader Pump Div., Canton Stoker Corp.

The Western Machinery Co., San Francisco, Cal., has announced these executive appointments: H. J. Mayer, executive vice president; C. F. Skinner, general manager of manufacturing, engineering and construction; R. B. Utt, chief executive engineer; W. H. Newton, general sales manager for "WEMCO" products and Western Knapp Engineering services.

Gar Wood Industries, Inc., Wayne, Mich., has appointed Harold C. Clark sales manager, Findlay Div., Findlay, Ohio. Mr. Clark will direct sales activities for the "Buckeye" line of ditchers and road-building machinery, and for power excavators and cranes. From 1952 to 1954 Mr. Clark served as eastern district manager of the Findlay Div. He later became product sales manager for "Load-Packer" refuse-collection bodies.

R. A. Harmon has been appointed district sales supervisor of the Twin Disc Clutch Co., Racine, Wis. He will be responsible for coordinating geographical marketing and supervising the activities of Detroit, Los Angeles, Newark, Cleveland, New Orleans, Rockford and Racine branch sales office. Mr. Harmon has been connected with sales engineering since joining Twin Disc more than 8 yr ago. He was field representative, eastern district sales engineer and manager dealer sales before being promoted to district sales supervisor.

N. V. (Norb) Chehak has been appointed assistant sales manager of Link-Belt Speeder Corp. In his duties at the factory in Cedar Rapids, Ia., Mr Chehak will aid G. W. Rowand, sales manager, in marketing crawler and rubber-tired shovel-cranes. Chehak joined Link-Belt in 1949, first in the company's sales office, later as representative in the Pacific Northwest and Canada.

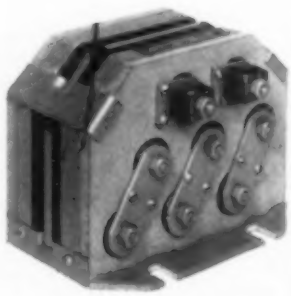
Baldwin-Lima-Hamilton Corp., Construction Equipment Div., Lima, Ohio, has appointed J. V. Gunter district sales manager for "Lima" shovels, cranes and

GUYAN
RESISTORS
FOR
MINING
MACHINES

• • •

Guyan Resistors are available for all types of mining machines and loaders. No alterations are necessary. The resistors are designed to fit the original pockets of the machines.

Note the lightweight sturdy framework of angle steel fabrication. The helical coil resistance element can be removed quickly and easily should repair be necessary. Guyan Resistors are available from stock for all common types of mining machines. Resistors can be furnished for any type machine when correct information is made available.



GUYAN MACHINERY CO., *Logan, W. Va.*

To the man who's thinking about buying a new truck:

maybe you're missing something...

➢ And what you're missing is more than "maybe," it's for *sure*—if you haven't yet visited your Dodge truck dealer.

➢ Do you want to miss a *rock-bottom price?* Perhaps you haven't realized that Dodge trucks actually cost *less* than you'd pay for corresponding models of most other makes.

➢ Do you want to miss *power* so high it leads the field? Consider this: with engines of 169 to 175 horsepower, Dodge overpowers *every other leading make of truck* in the low- and medium-tonnage fields.

➢ Surely you don't want to miss the many advantages of "*Job-Rated.*" Because all units from engine to rear axle are engineered and matched for a specific job, the Dodge truck you buy is exactly *right* for your business.

➢ You don't want to miss Dodge safety—which includes the biggest wrap-around windshield of any truck on the road, the shortest turning radius. Or Dodge superior cab comfort . . . Forward Look Styling.

➢ In short, you get a whale of a lot more truck for a good deal less money than you think! Stop in and see your Dodge truck dealer right away—don't miss *anything!*

DODGE Job-Rated **TRUCKS**

WITH THE *FORWARD* LOOK

Stick Free
CORE SHELL
multiplies
mechanical operating life
5 to 6 times

A unique one-piece drawn core-shell with embossed guide points increases the mechanical operating life of the Durakool Timer-Relay five to six times, practically putting it in a "fail-safe" class. These relays are available in single or multiple units with single unit capacities of 10, 30 and 60 amperes. Time delays from 0.15 to 20 seconds—any operate-release time combination. These new 1955 relays are now in production—no extra cost.

See telephone directory for local distributor, or write.

PRE-SET TAMPER PROOF
TIMER-RELAY

GUARANTEED FOR AC-DC APPLICATION
and:
- No plunger sticking
- No chatter
- Quiet operation
- No double contacting

DURAKOOL, INC.
ELKHART, INDIANA, U.S.A. ••• 700 WESTON RD., TORONTO, CANADA

Durakool ALL-STEEL MERCURY Timers

NOW - ON THE SPOT FILTRATION . . .

for all your oil hydraulic systems and machines

SCHROEDER FILTER BUGGY

It r lls right to the job!

Protect your hydraulic equipment . . . save oil . . . reduce down time . . . cut repair costs with a Schroeder Filter Buggy. Mounted on rubber tired wheels, the Buggy, only 48½" high x 26½" wide, can be easily pushed from one machine location to another.

13,944 square inch filter area!

The pleated radial fins of the phenolic impregnated cellulose filter furnish 13,944 square inches of filtering area. This highly efficient filter has an initial particle selection of 10 Microns (.00039) and filters out particles so small they cannot be seen with the naked eye . . . however, it will not remove additives nor will it affect chemical or waterbase flame-resistant fluids.

Your request will bring complete information

SCHROEDER BROTHERS
HYDRAULIC, ELECTRIC & PNEUMATIC EQUIPMENT
3116 Penn Ave. Pittsburgh 1, Pa.
EXpress 1-1571

draglines in the southern district. He succeeds Fred L. Maus, who joined the R. A. Young distributor organization in Ft. Smith, Ark. Mr. Gunter will operate from the Baldwin-Lima-Hamilton branch headquarters in Atlanta, Ga., covering the states of Arkansas, Louisiana, Tennessee, Mississippi,, Alabama, N. Carolina, S. Carolina, Georgia, Florida and sections of Virginia, Oklahoma and Missouri.

Richard C. Bierck has been appointed general sales manager of Dean Bros. Pumps, Inc., Indianapolis, Ind. He was the company's regional sales manager before the appointment. In a realignment of the company's sales department, Mr. Bierck appointed these district sales managers: Keith G. Huizenga, Miles Scheffel, J. Rober Krebs and John L. Ryan.

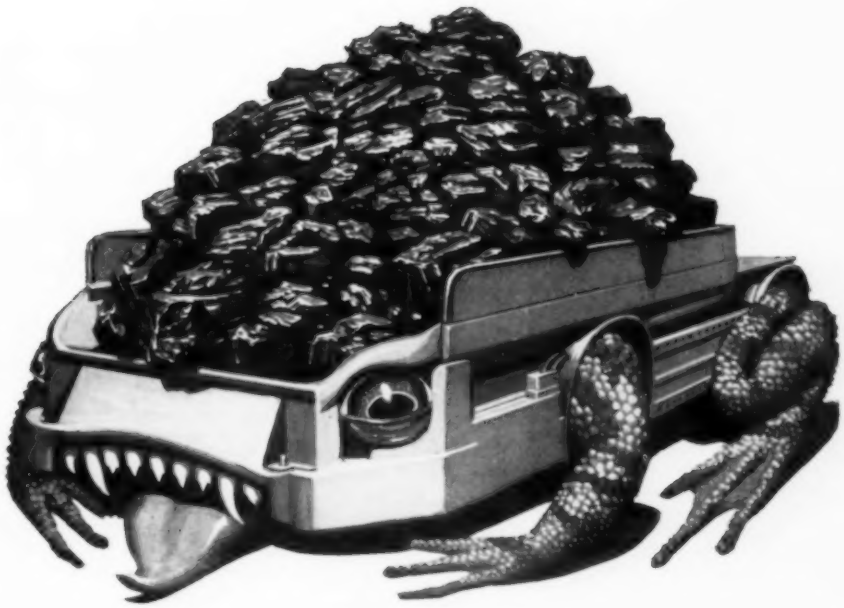
The formation of a new sales district effective Jan. 1, has been disclosed by Ralph C. Dean, sales operations manager of General Electric's Construction Materials Div. The new district, is named "Mid States." It comprises the trading areas of Cincinnati, Dayton and Columbus, Ohio; Indianapolis and the entire southern half of Indiana; Charleston and Parkersburg, W. Va; and Kentucky. Linvill L. Young is manager of the district. Mr. Young has been with the General Electric Co. since 1934. His offices are at 215 W. 3rd St., Cincinnati, Ohio, headquarters for the new sales district.

Tower Oil Co., Chicago, Ill. has been appointed national distributor for industrial sales of "Micro-Moly," dgf., Miracle Power and Micro-Molygraf lubricants. All are produced by the Miracle Power Div., AP Parts Corp., Toledo, Ohio.

The Ray C. Call Co., S. Charleston, W. Va., has been made an authorized dealer of Euclid earth moving equipment. The company's territory covers West

COAL MEN ON THE JOB

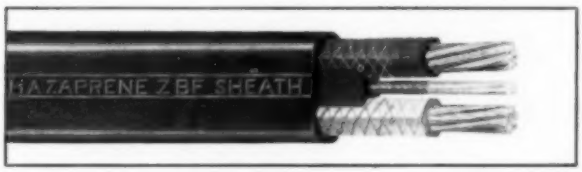
C. W. PADGETT, general superintendent, Bell & Zoller Coal Co., Johnston City, Ill.



tonic for a tired shuttle car

The shuttle car is just about the hardest working machine in a coal mine. It's a glutton for punishment and for cable, too. The fate it hands out to cable is cruel—a succession of run-overs and almost constant abrasion. But, tough as a shuttle car is, there is nothing more "beat" than one that's suffering from beat-up cable.

It's different, however, with Hazacord Red Saddle Hex-Tite Shuttle Car Cable on the job. Hazacord's Hex-Tite design prevents internal slipping and rotation, forms a solid locked-tight construction that makes Hazacord the match for any shuttle car. And the Red Saddle pre-formed protective wall of neoprene assures a uniform fill between conductors . . . positive protection against short-circuiting due to run-overs.



Hexagonal insulation provides six plane surfaces to lock with the Hazaprene ZBF sheath and bonded Red Saddle, preventing internal slipping and rotation. Heavy reinforcing cords, embedded in both insulation and sheath, are an additional guard against pulling and a special adhesive completes the bonded construction.

Hazacord's heat-resistant insulation, bonded to the extra-flexible conductor, permits high operating temperatures. The Hazaprene ZBF sheath is cured under pressure in a continuous metal mold to assure: *1. optimum vulcanization; 2. maximum density; 3. lasting toughness; 4. smooth, wear-resisting surface; 5. resistance to mechanical abuse; 6. controlled diameter.*

Hazaprene sheaths are flexible and unaffected by oils, acids, alkalies and mine water.

Write for Bulletin H-450, the Hazard Mining Cable Catalog, for information on the cables that are a match for any shuttle car. Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, N. J.

HAZACORD

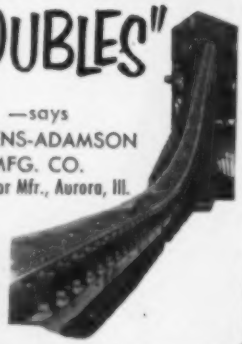
mold-cured portable cables

PRODUCT OF OKONITE RESEARCH

2416

"NO MORE LUBRICATION TROUBLES"

—says STEPHENS-ADAMSON MFG. CO.
Conveyor Mfr., Aurora, Ill.



"LUBRIPLATE Lubricants satisfy the 'one-shot' requirements of our conveyor idlers. LUBRIPLATE effectively lubricates each bearing in turn and flows through the hollow shaft to the next bearing. We do not know of a single case of bearing trouble through faulty lubrication where LUBRIPLATE has been used."

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

LUBRIPLATE LUBRICATION MAKES CARS AND TRUCKS RUN BETTER AND LAST LONGER

LUBRIPLATE H.D.S. MOTOR OIL . . . THE OIL THAT NEEDS NO ADDITIVES

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

Virginia, except the counties of Brooke, Hancock, Marshall, Ohio, Morgan, Berkeley and Jefferson, and Maryland's counties of Garrett and Allegany. The company also represents Detroit Diesel and Le Roi.

The Pennsylvania Salt Mfg. Co., Philadelphia, Pa., has appointed the Osmose Wood Preserving Co. of America Inc., Buffalo, N. Y. the only seller of the "Pennsalt" line of neoprene products for the United States mining industry.

Duane F. Kuntz has been appointed assistant manager of motor truck sales, according to W. C. Schumacher, vice president of International Harvester's motor truck division, Chicago, Ill. Before the new appointment Mr. Kuntz managed the company's southwest motor truck-sales region. He joined the company in 1926 as a sales trainee.

New Books for Coal Men

West Virginia Coals

Characteristics of Minable Coals of West Virginia, by A. J. W. Headlee, Richard G. Hunter, Homer A. Haskins, Ralph E. McClelland and others, covers the results of investigations by the staff of West Virginia Geological Survey on the physical and chemical properties of West Virginia coals. Samples were taken from active mining so that data obtained would have immediate application to coal now being mined. *166 pp, 6¼x9¼-in; cloth. No price quoted. Geological and Economic Survey, P. O. Box 879, Morgantown, W. Va.*

Gas Ignition

Frictional Ignition of Gas by Mining Machines, by Irving Hartmann, describes how gas may be ignited by frictional heating. Measures to take to avoid it are listed. *USBM, I. C. 7727. 17 pp. 8x10½-in; paper, mimeo. Free, Publications Distribution Sect., 4800 Forbes St., Pittsburgh 13, Pa.*

Mineral Industries Map

Mineral Industries of Illinois is a map compiled and prepared by the Educational Extension Division of the State Geological Survey showing locations of deposits, mine and processing plants for mineral resources of Illinois. *Available from State Geological Survey, Urbana, Ill.*

Ohio Valley Ground Water

Ground-Water Resources of the Ohio River Valley in West Virginia, by Charles W. Carlston and George D. Graeff Jr. Covers the results of field investigations in the valley by the USGS in co-operation with the West Virginia Geological Survey and provides information on the availability of large supplies of ground water. *Available from Geological and Economic*

NEWCOMER CARBIDE MINING TOOLS *for greater production... EVERYWHERE!*

NEWCOMER CARBIDE and CARBIDE MINING TOOLS are made in one plant specializing in Controlled Quality Carbide and Carbide Tools.

NP MACHINE BITS

Designed with a durable alloy steel shank, heat treated to withstand considerable abuse, and properly shaped NP Controlled Quality Carbide Tips that give maximum cutting with minimum power consumption.

NP DRILL BITS

The drill with the twist that counts . . . developed through intensive research to commercially produce a drill head combining the exceptional wear resistance of NP Cemented carbides with the free-cutting, non-clogging features of the old style twisted steel bit.

NP ROOF DRILL BITS

Extremely satisfactory in use even under abnormal conditions. Available in both slotted and solid spade types. Tipped with NP Controlled Quality Carbide, these bits assure faster drilling with less feed pressure than normally required.

Send today for Mining Tool Catalog MT-553

NEWCOMER PRODUCTS, INC.
Latrobe, Pa.

General Sales Office:
512 Franklin Ave., Pittsburgh 21, Pa.
Other sales offices in principal mining areas.

LIMA

SHOVELS AND DRAGLINES

are geared to mining conditions

Down time in digging operations is costly—not only because of difficult on-the-job maintenance—but because down time of machines ties up costly labor and idles other expensive equipment. Lima shovels and draglines, with "built-in" stamina for the tough jobs, pay big dividends by assuring continuous operation with maximum output at lowest cost.

Painstaking care in every step of manufacture assures the quality of every part, long trouble-free service of every Lima machine. You'll be able to put a Lima to work and keep it working day in and day out with only routine maintenance.

Get complete details from your nearby LIMA distributor . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Sturdy unit-type construction.
2. Simple, rugged design.
3. Low center of gravity.
4. Long wide crawlers for greater stability.
5. Permanent shaft alignment.
6. Smooth running anti-friction bearings.
7. Ample power for big output.
8. Big capacity drums and sheaves are easy on cable.
9. Air-operated clutches on most models.
10. Large braking areas.

These are only a few of the features which help you *strip more, dig more* and *load more* with a LIMA. There's a type and size for every job—shovels to 6 yds., cranes to 110 tons and draglines variable. Smaller capacities on rubber.

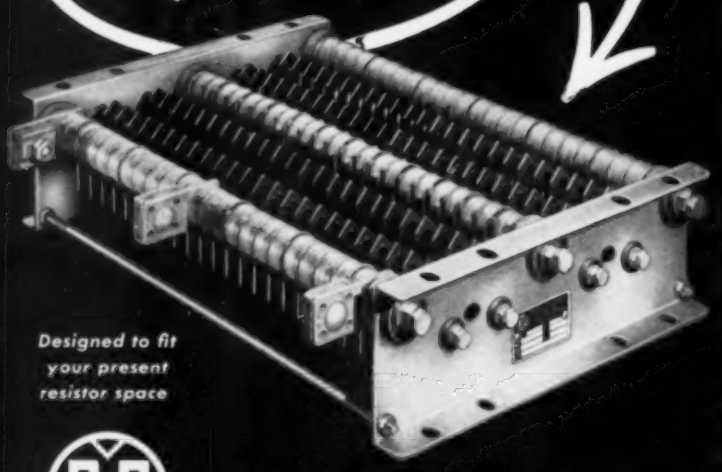
DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA SHOVELS · CRANES · DRAGLINES · PULLSHOVELS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division · LIMA · OHIO · U. S. A.

RUGGED
all the way thru!



Designed to fit your present resistor space

P-G STEEL GRID RESISTORS
consistently prove their value in
MINING SERVICE

- Steel Construction
- Mica Insulation
- Corrosion Resistant
- Vibration Proof
- Moisture Resistant
- Provision for Expansion
- Adequate Ventilation
- Rugged Terminals

By use of those durable raw materials . . . steel and mica, and the P-G exclusive features of design, these steel grid resistors have the "built-in quality" to overcome factors which often cause resistor failures. Vibration, moisture laden or corrosive atmospheres have little effect on continuity of service. Try Post-Glover Resistors for heavy duty applications where resistors are subject to severe service . . . continuous "Trouble-Free" performance is assured.

P-G The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY
• ESTABLISHED 1902 •
221 WEST THIRD STREET, CINCINNATI 2, OHIO

Survey, P. O. Box 879, Morgantown, W. Va.

Fossils

Ohio Fossils, by Aurele La Rocque and Mildred Fisher Marple. Serves as an introduction to the paleontology of Ohio and is designed for those who have never studied the subject before. *Bulletin 54. 152 pp. 8½x11-in.; paper. $1 for Ohio residents. Ohio Division of Geological Survey, Room 106, Orton Hall, Ohio State University, Columbus 10, Ohio.*

The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications Distribution Sec., 4800 Forbes St., Pittsburgh 13, Pa. All are 8x10½-in; paper; mimeo.

Estimate of Known Recoverable Reserves and the Preparation and Carbonizing Properties of Coking Coal in Marion County, Tenn., by Lloyd Williams, R. E. Hershey and B. W. Gandrud. *R. I. 5159.*

Estimate of Known Recoverable Reserves of Coking Coal in Brooke County, W. Va., by J. J. Dowd, J. M. Provost, R. G. Travis, R. F. Abernethy and D. A. Reynolds. *R. I. 5160.*

Estimate of Known Recoverable Reserves of Coking Coal in Ohio County, W. Va., by J. J. Dowd, J. M. Provost, R. F. Abernethy and D. A. Reynolds. *R. I. 5171.*

Recovery of Coal From Washery Refuse: Some Samples of the Effect of Continuous Mining Machines on Preparation Problems, by M. R. Geer, F. D. Fennessy and H. F. Yancey. *R. I. 5152. 45 pp.*

Smelting Iron Ore With Anthracite: Bureau of Mines Experimental Blast Furnace, by R. C. Buehl and M. B. Royer. *R. I. 5165. 15 pp.*

COAL MEN ON THE JOB

ARTHUR GOTHARD, superintendent, Buckhorn mine, Bell & Zoller Coal Co., Johnston City, Ill.

Diagram showing magnetic field for 2-coil, 36-in.-dia., 42-in.-wide pulley. Note how magnetic field blankets entire load.

New magnetic pulley stops tramp iron riding the load peaks

This new Stearns 2-coil electro-magnetic pulley effectively removes tramp iron riding the crest of a conveyor load as well as the pieces that pass close to the magnet's face. Two-coil design produces a powerful magnetic field that is deepest at the center of the conveyor belt where load is heaviest. Thus, the area of magnetic attraction is the same general shape as the load on a conveyor operating under standard conveyor practices.

Smaller, lower-cost pulleys now practical

Because of the nature of the magnetic field, smaller pulleys costing less can now be used on jobs where larger units were formerly needed. An examination of data on a number of proposed installations showed that, in the majority of cases, the recommended new 2-coil pulley was of smaller diameter than a 3-coil pulley of comparable ability.

New, simple pulley selection method*

Because this pulley fits right into recommended conveyor standards for speed of belt travel and depth of load for various types of materials, it is far simpler to select the right pulley than ever before. Stearns provides new selection tables in Bulletin 303-C that now make it possible for you to select the right size unit for your job even before you consult our sales engineers.

Get all the facts on this new magnetic pulley. Find out how it simplifies pulley selection. Write for Bulletin 303-C.

*Copyrighted 1954, Stearns Magnetic, Inc.

1133

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC., 661 S. 28th St., Milwaukee 46, Wisconsin

use JOY
SURGEPRUF
... THE NON-SKIVE COUPLING
WITH THE DOUBLE-WEDGE GRIP

PERMITS THE USE OF MORE ABRASION-RESISTANT, RUBBER-COVERED HOSE

Insure longer wear in your hydraulic hose assemblies—and at the same time, save assembly time by avoiding old-fashioned skiving. Joy Surgepruf re-usable couplings make *both* advantages possible. Their exclusive "double-wedge" grip lets you use tough, abrasion-resistant, rubber-covered hose instead of the braided type—without any need for skiving the hose at the connection.

NO SPECIAL ASSEMBLY TOOLS REQUIRED

You need no mandrels or special tools to make up Surgepruf assemblies. No extra cost or special method is involved.

CAN BE RETIGHTENED WHEN LOOSE ON THE HOSE

Machine vibration or hose flexing can loosen any hydraulic coupling on the hose in time, but Surgepruf Couplings can be easily, quickly retightened on the job to stop a leak—*another* exclusive feature.

Surgepruf Hose Couplings are made to JIC Standards. Assemblies are available in many sizes and lengths, and in both single and double-wire reinforced types for medium-high and high pressure service respectively. *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*

Write for FREE Bulletin 10-1

Consult a Joy Engineer

JOY

HYDRAULIC ASSEMBLIES THAT GIVE YOU MAXIMUM RELIABILITY

W&O M1628-10

World News (*from p 114*)

Britain, once the world's greatest coal exporter, will this year send abroad only 6,000,000 tons. The pre-World War II figure was 36,000,000 tons; before World War I it was 75,000,000. Because of falling production and rising home demand, the government has decided to slash exports by 5,000,000 tons this year. Last year's total of some 11,000,000 tons was, itself, a cut of 2,000,000 from 1954. Only Denmark and Eire will get appreciable supplies this year: 3½ to 4,000,000 tons between them. This leaves 2 to 2,500,000 tons for the rest of the world.

Copper mining companies in Northern Rhodesia have decided, after consultation with their government, to look into the possibility of again importing coal via Lobito Bay on the African west coast. During the last 9 yr, the copper mines have imported about 150,000 tons, mostly from the United States. The newest decision to import again occurred because of the inability of Rhodesian railways to move enough coal to meet demands and to insure sufficient winter supplies. During the next 6 mo copper companies will need 560,000 tons.

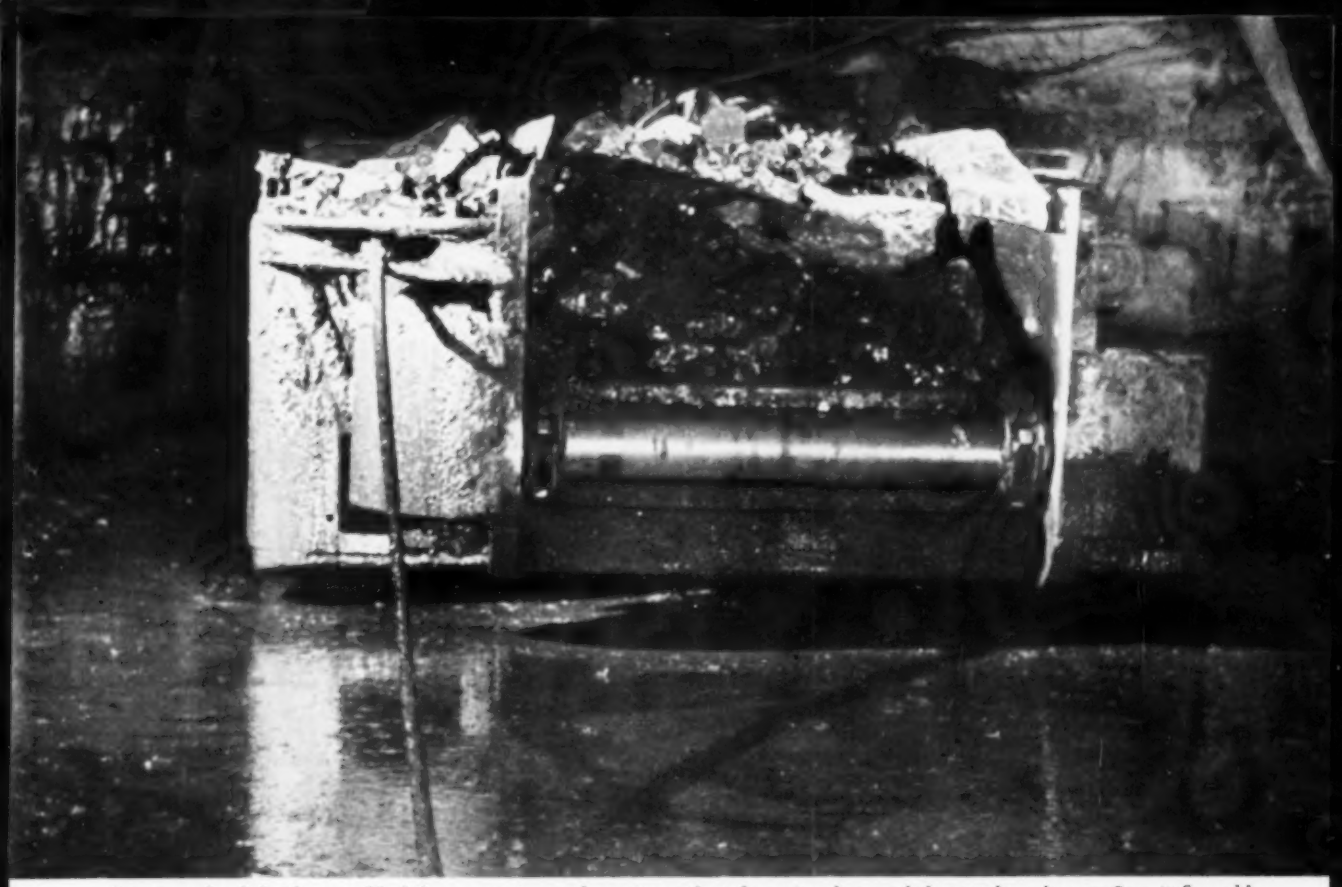
India will require around $100,000,000 worth of coal-mining equipment in the next 5 yr to attain its annual production target of 15,000,000 tons under the second Five Year plan commencing this year. Supplies of technical advice and equipment from Soviet Russia were being discussed last month in New Delhi during the Bulganin-Kruschev tour of India. New Delhi sources say that Britain, East Germany and Poland are other countries that may be approached by India for equipment and technical cooperation.

The tight coal supply situation in western Germany eased somewhat during the last 2 mo of 1955 and most coal-mining authorities expect no serious shortages this winter. They predict that supplies will be sufficient to keep industry running, even at the present rate of expansion, provided the weather does not turn unusually cold. Supplies of household coal are also expected to be adequate. Hard coal production increased to about 11,235,000 tons in October, against 11,060,000 tons in October, 1954. Production per working day was 432,000 tons, against 425,400. In November nearly 11,000,000 tons were mined, 250,000 less than in October.

Russia claims to have perfected a completely-automatic pneumatic drifter that can head 335 ft of horizontal or inclined coal seam in 24 hrs. Invented by Yakov Gumennik, the machine is said to hew instead of cut coal in seams 6 to 10 ft thick, according to the magazine Sovyetsky Soyuz. The drifter supports itself against the walls of the workings with three crawler tracks. It is started from a special casing brought to the heading site on rails. Pneumatic hoses connect the "steel mole" with a gallery from which its work is controlled. The Russians say the machine has increased productivity 600%, since it has eliminated dynamiting and the use of a coal loader.

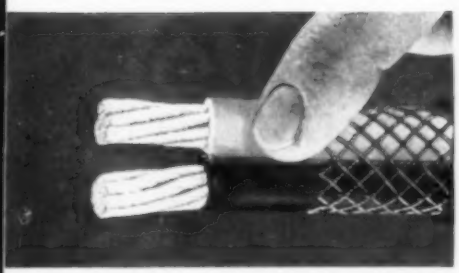
COAL MEN ON THE JOB

FIRST SHIFT, SHAMROCK MINE, Truax-Traer Coal Co., Kayford, W. Va. Front row, left to right, mine foreman Sam Kraft, superintendent Lawrence Hill and section foreman Lewis Grant. Back row, left to right, section foremen Bob Clark, Tazewell Foley, Jack Belcher, W. W. Painter and W. W. Toney.

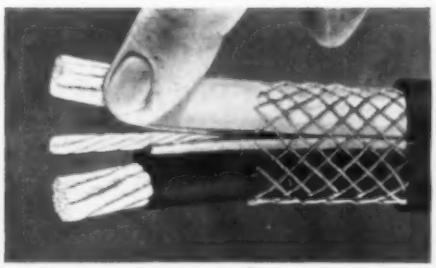


2-year study of shuttle car cable failures gave Anaconda engineers the information they needed to produce the new Securityflex cable.

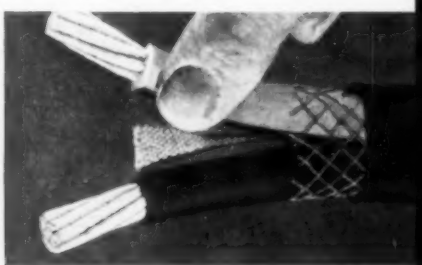
We engineered this cable "inside out"— to give you longer cable life



New Neoprene insulation compound gives Securityflex rugged *inner* strength.



New flat stranding of grounding conductor prevents broken wires and failures.



New nylon Anti-Short Breaker Strip* delivers amazing crush resistance.

Before designing the new Securityflex* cable, Anaconda engineers checked thousands of shuttle car cables of all makes to see why they failed.

Using this study, Anaconda engineers designed the new Securityflex* cable—from the *inside* out. To combat the effects of constant flexing and impact, and occasional crushing, new neoprene insulation, new stranding of grounding conductors, and new nylon Anti-Short Breaker Strip were added to give it rugged *inner* strength as well as tough outer strength.

In addition—full, 50% grounding wire insures greater electrical protection, longer life, and extra safeguard against excess tension. Anaconda's flat, service-proven grounding wire allows more cable on reel—will not cut insulation if cable is crushed by runovers. Millions of feet of new Securityflex have been sold without a reported failure of grounding conductor. Insist on full-size grounding conductor for safety.

The Man from Anaconda has full details and samples for you. Call today, or ask your distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

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Sales Agent:
KANAWHA RAIL & MACHINERY CO.,
CHARLESTON, W. VA.

Institute (Con't from p 119)

said, "I would like to see every member of top management take at least two young men 'under his wing,' encourage them to go to mining colleges, show personal interest in them that will attract them to mining and try to develop them into top managers."

Speaking of what can be done to secure qualified men for positions as superintendents or higher supervisors, Mr. Whittaker advocated more support for the work of the National Coal Association education committee, improved scholarship programs for selected high school graduates and more interest in their development, effective co-operation among the union, operators and other agencies with the object of breaking the barriers in upgrading rank-and-file into supervisory jobs, and advertising the coal business to a greater degree.

A candidate for a superintendent's job should have at least a high-school background. Then the best follow-through in training the man is to place him in a specific job where he will have some responsibility for getting results. This is in contrast to methods in use in some places in which the candidate is little more than an observer of jobs being done, Mr. Whittaker said.

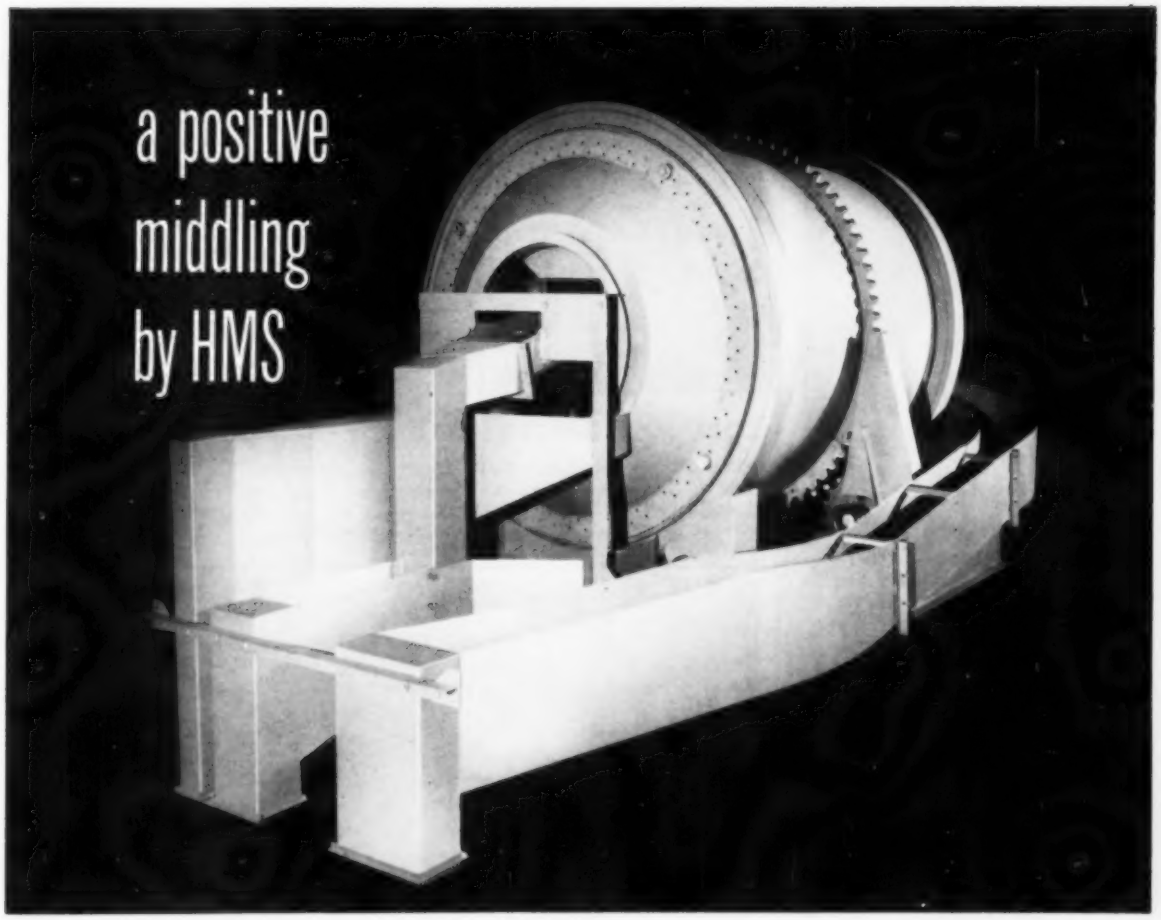
TRAINING OPERATIONS BOSSES

Mining is a far cry from what it used to be, Mr. Stump said, in pointing out the need in mechanized mining for teamwork among production and maintenance officials. Today's face supervisor must know a great deal more to operate successfully. He must realize the value of time since production is measured in tons per minute rather than tons per hour.

In looking over the pool from which operating supervisors may be drawn, Mr. Stump noted a dwindling in extension-course enrollment and a reasonable desire among young college graduates to use operating supervision as a stepping stone to higher jobs. If the industry is to stop this downward trend in the supply of operating supervisors, it must make the jobs more attractive by presenting a plan having sufficient benefits to offset those a man leaves behind in his labor organization. And present and future supervisors must have the advantage of continuous training. Mr. Stump pointed out that his company, Rochester & Pittsburgh Coal Co., subscribes to a program of supervisory conferences on costs, maintenance and other pertinent questions.

In laying out the history of development of the accident-prevention training of the Bureau of Mines, Mr. Tomlinson said the Bureau now feels that the best way to operate is to train both officials and workmen in the same classes, since the responsibilities of both groups are brought out by the instructors.

The relationship between workmen and officials is improved when both obtain a clearer realization of their common desire, maximum safety. Plans now are under way toward developing a follow-up course and it is hoped that the Bureau soon will have something to offer the industry in this respect, Mr. Tomlinson reported.



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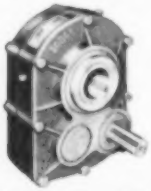

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COAL MEN ON THE JOB

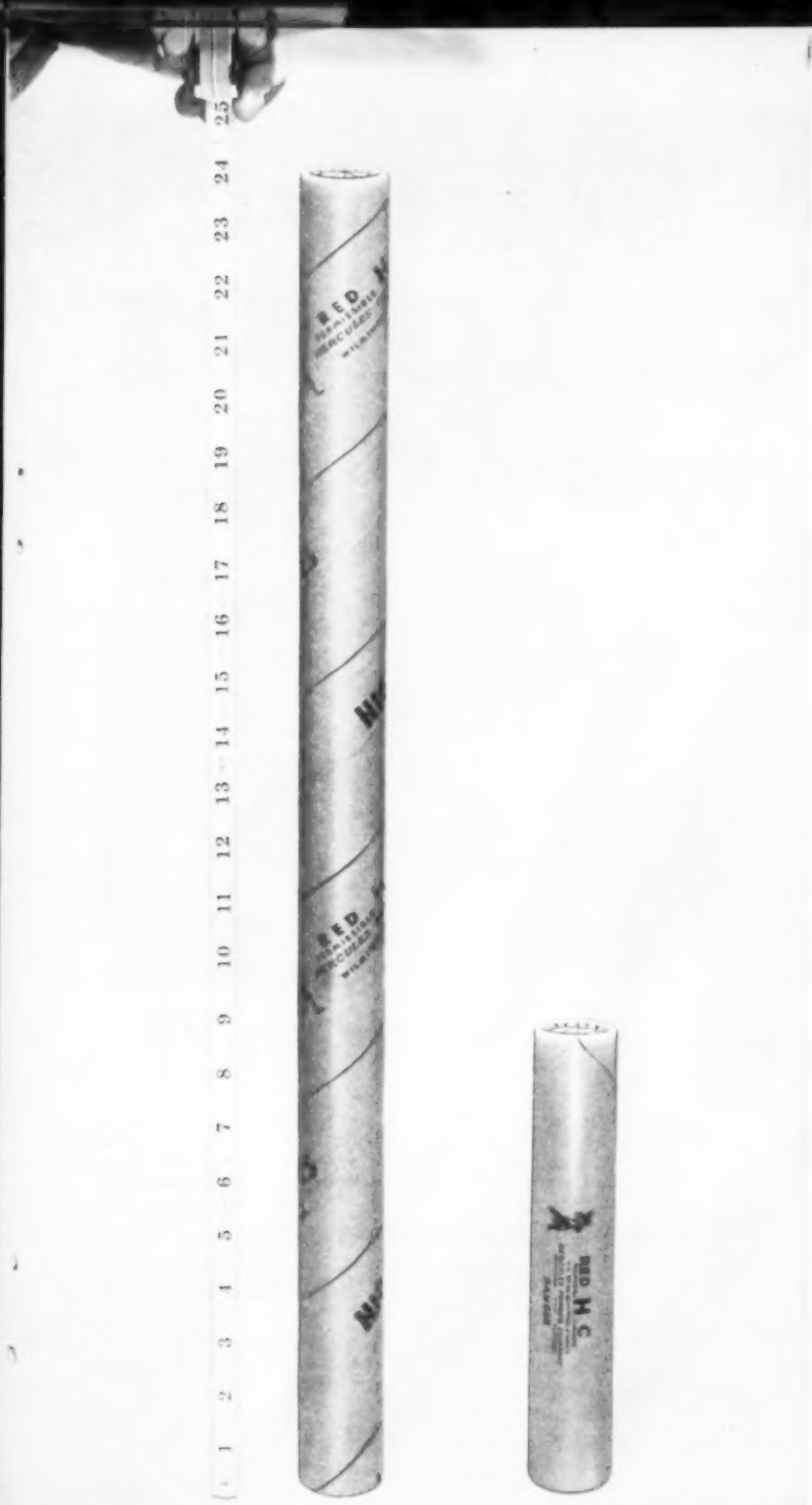
BELL & ZOLLER COAL CO., Buckhorn mine, Johnston City, Ill. Gilbert Engram, resident engineer (left); Walter Schrade, preparation foreman; and Julius Bione, assistant engineer. Photo was taken in engineering office near Buckhorn slope and preparation plant.

COAL MEN ON THE JOB

COLONIAL COAL MINING CO, Madisonville, Ky., W. D. Humphrey, engineer (left); R. D. Whitmer, assistant engineer; J. E. Kennett, assistant secretary; and Luke Shoulders, preparation foreman. Men are reviewing mining and preparation plans in Colonial's office near Madisonville.

COAL MEN ON THE JOB

SECOND SHIFT, SHAMROCK MINE, Truax-Traer Coal Co., Kayford, W. Va. Left to right, section foremen Thurman Graham and V. A. Davis; personnel manager of W. Virginia division E. R. Templeton; Section foreman Joe Cummins; night foreman Mack Mullens; and assistant foreman Nash Elswick.



THE LONG AND THE SHORT OF IT . . . Here is a new Hercules "King-Size" permissible cartridge—24 inches in length—shown alongside the same grade in the conventional 8-inch size.

NOW... "KING-SIZE" PERMISSIBLES

Hercules permissible powders packed in "King-Size" cartridges are now available for use in coal mines. Field tests of these new "King-Size" cartridges show that they have many advantages, some of which are:

- **A continuous column of permissible powder in bore holes minimizes misfires and reduces the hazard of unshot powder in the coal.**
- **Predetermined cartridge weights effect economies in the powder consumption.**
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Hercules "King-Size" cartridges are supplied in most permissible grades, in lengths from 12 to 24 inches and in diameters of 1¼ to 2 inches.

Our representatives are ready to discuss your explosives needs and to give more information on how the new "King-Size" cartridges can do more work for you at lower cost.

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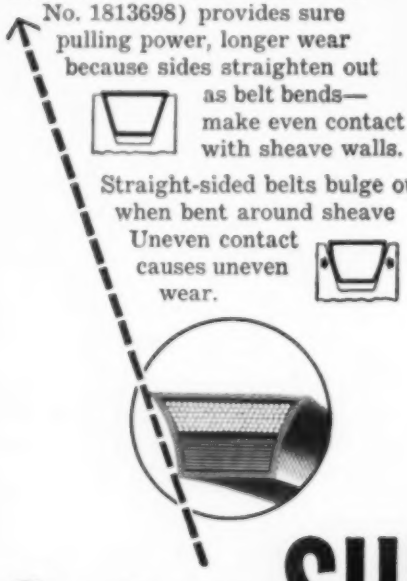
SHOCK LOADS

than any standard V-belt

Here are the interesting reasons why Gates Super Vulco Ropes stand up months, even years longer than any standard V-belts...

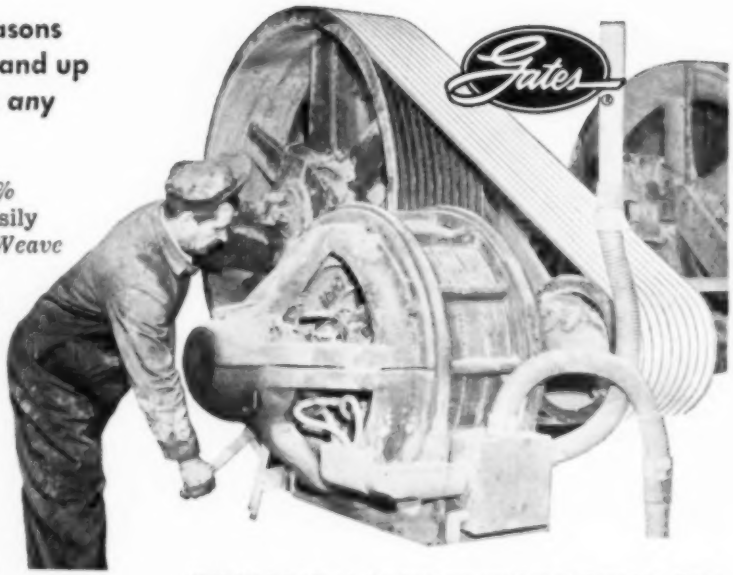
1. *Super-Strength Cords* provide 40% greater horsepower capacity . . . easily absorb heavy shock loads. **2.** *Flex-Weave Cover* (U.S. Pat. No. 2519590) provides greater flexibility with far less stress on the fabric. Cover wears longer — increases belt life, lowers belt costs.

3. *Concave Sidewalls* (U.S. Pat. No. 1813698) provides sure pulling power, longer wear because sides straighten out as belt bends—make even contact with sheave walls.



Straight-sided belts bulge out when bent around sheave

Uneven contact causes uneven wear.



SHOCK LOAD of this big jaw crusher at Canadian Quarries, Ltd. is absorbed by Gates Super Vulco Rope Drive. Wherever shock load is severe, Gates Super Vulco Ropes cushion the shock—keep machinery replacement cost down.

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Gates SUPER Vulco Rope

The V-Belt with 40% more horsepower capacity

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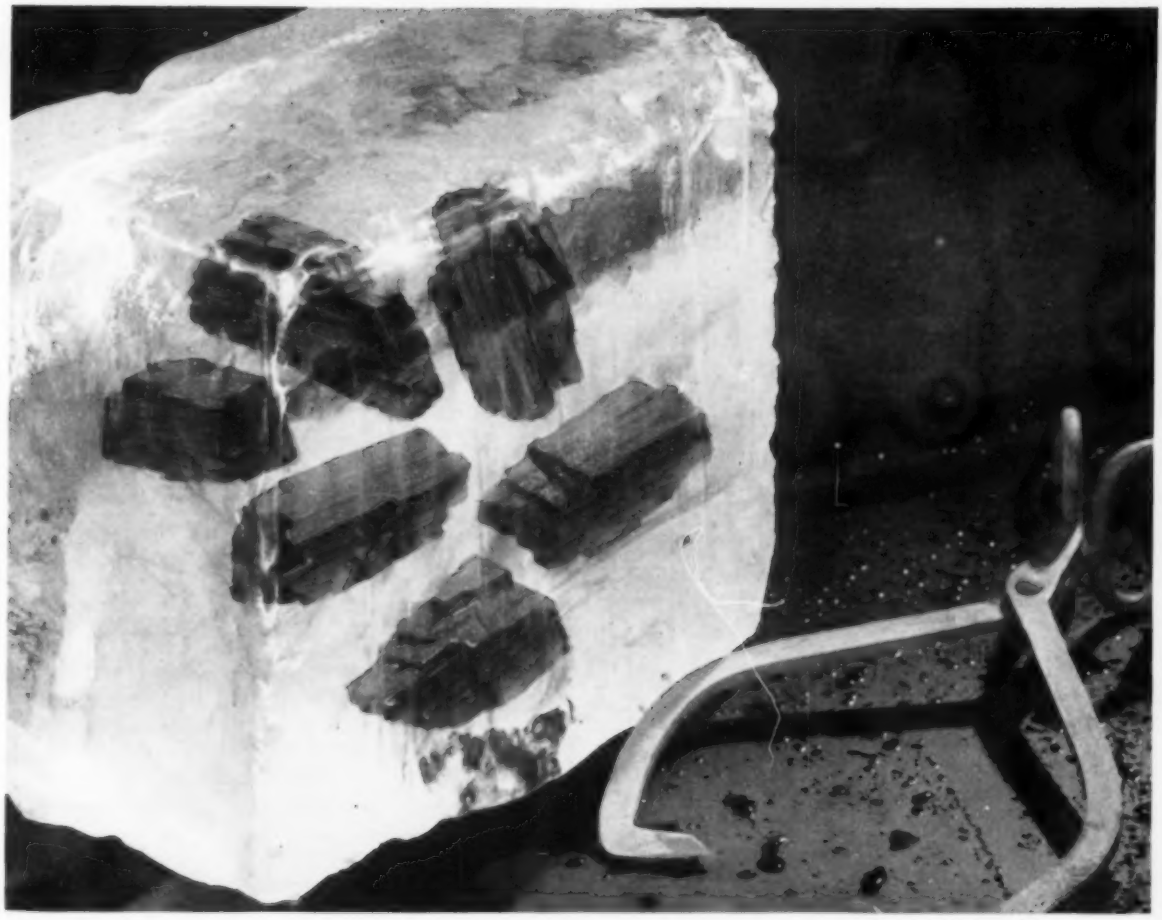

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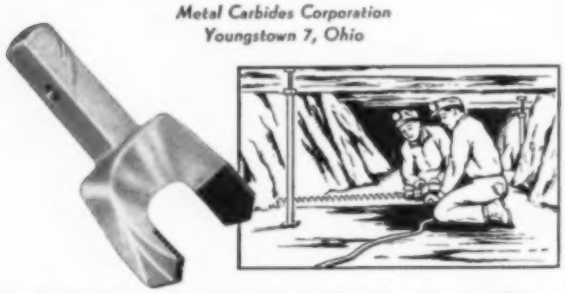

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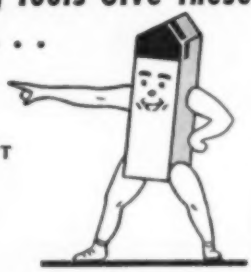

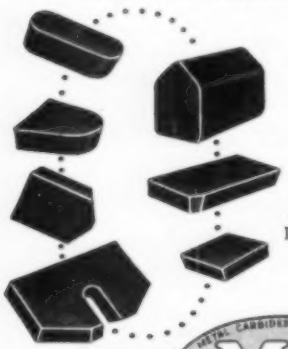

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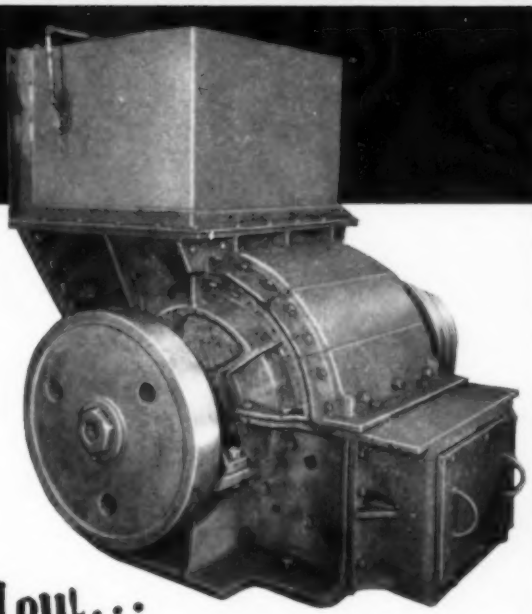

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AMERICAN HEAVY DUTY "S" CRUSHER

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- Adds More Profits for Years

A dozen installations of the new Heavy Duty "S" Crusher prove that it cuts labor costs by eliminating men at the picking tables.

It also offers important savings in recovered coal—coal that was formerly thrown away because of imbedded impurities. It is now crushed and washed for reclamation.

The Heavy Duty "S" is powerful enough to reduce ROM coal 42" x 36" x 30", as well as rock, slate, sulphur balls and gob, without oversize.

By cutting labor costs, by adding to your output, the new Crusher pays for itself in less than a year. From then on it's clear profit.

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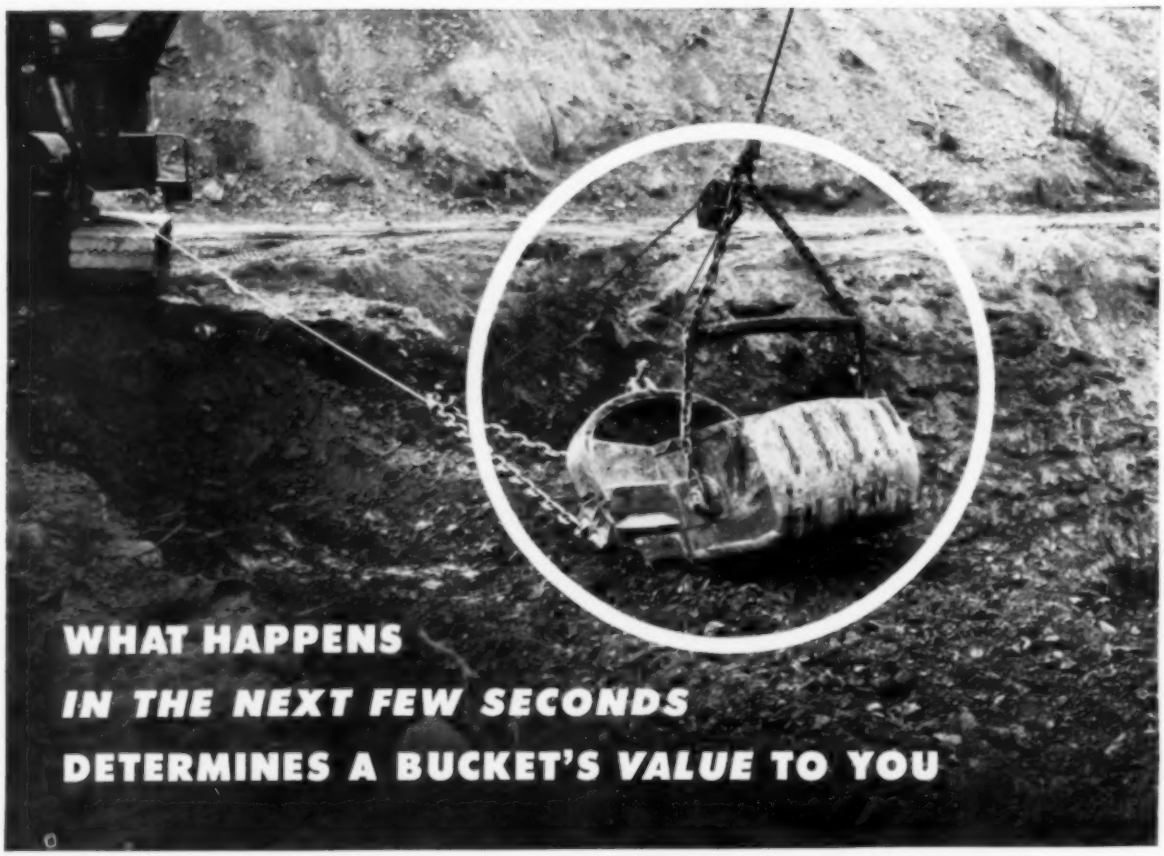
Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Ave., Saint Louis 10, Mo.



If it's a Page Automatic... it starts digging sooner... fills faster and carries out more material than any other bucket

The first few seconds after a dragline bucket lands in the pit tells the story of its productive capacity and *actual value to you.* If the bucket digs in instantly at the first pull of the load line . . . if it fills completely in 1½ to 2 lengths . . . and carries out its full rated capacity-it's a good bucket.

And if it will do this day in and day out, year after year, chances are it's a Page Automatic. No other bucket has the automatic digging action, loading speed or carry-out capacity of a Page . . . no other bucket will give you the production that a Page will give you.

Let us prove our point. We'll put a Page Automatic on your machine—let your operator run the test and *you* be the judge. There's no obligation. Ask your nearby Page Distributor for full details today. Write for Bulletin GPB-454.

Page
Automatic Dragline
Buckets
Walking Draglines

If it's a Page... It DIGS

B-3104

PAGE ENGINEERING COMPANY · Clearing Post Office, Chicago 38, Ill.

NEW SPEED AND DRILLING ECONOMY

Parmanco

Model 51-55 Dual

COAL DRILL

TWO DRILLS IN ONE

"It's a life saver to us"
says W. V. Hartman, Supt. Victoria Coal Corp.

Working ahead of an 8-yard loading shovel in 4-ft. coal, speed is essential.

Traction, hydraulic and electrical system operated by 109 hp engine. Push button controls. Drills can be operated singly or in tandem.

CUTTINGS SHIELD and GUIDE

—completely automatic

Blast holes, as seen in the picture, are kept clean from cuttings dropping back down the hole. A dam is formed about each blast hole excluding casual surface water.

•

SEND FOR COMPLETE DETAILS

•

PARIS MANUFACTURING CO.
PARIS, ILLINOIS

7 Reasons Why KING KOAL CONVEYOR BELTING

gives you . . .
positive protection against the common causes of belt failure...

Gathering, mainline entry, slope or preparation...Hamilton King Koal Conveyor Belting is engineered and built for top production — all around the clock and all around the calender. In every detail from cushion cover to duck plies, quality is the "word" that works for you at Hamilton.

*Breaker fabric available if required

Write, wire or 'phone today for your copy of the new Hamilton Catalog — complete specifications on belting, hose, packings.

Be sure . . . use Hamilton . . . Always dependable!

HAMILTON RUBBER MANUFACTURING CORPORATION

Executive Office and Factories, 1021 Meade St., Trenton 3, N.J.

BRANCHES. IN: CLEVELAND • HOUSTON
INDIANAPOLIS • LOS ANGELES • NEW YORK
PITTSBURGH • SAN FRANCISCO

OVER 85 YEARS OF SERVICE TO INDUSTRY

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:
$1.20 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.
POSITION WANTED undisplayed advertising rate is one-half of the above rate, payable in advance.
BOX NUMBERS count as 1 line additional.

INFORMATION:
DISCOUNT OF 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals). EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page.

DISPLAYED RATE:
The advertising rate is $10.20 per inch for Equipment and Business Opportunity advertising appearing on other than a contract basis. Contract rates quoted on request.

EMPLOYMENT OPPORTUNITIES—$12.80 per inch, subject to agency commission.

NEW ADVERTISEMENTS: Address N.Y. office, 330 W. 42 St., N. Y. 36, For February issue. Closing January 18th.

POSITION VACANT

Wanted: Graduate engineer to fill vacancy in Engineering Department of large coal mining operation. Must be qualified for underground and surface surveying, mapping and general drafting work and must be capable of designing simple structures. Man with experience preferred. Apply: Inland Steel Company, Wheelwright, Kentucky.

COAL MINING ENGINEER

Coal mining corporation with Headquarters in New York wants experienced engineer as assistant to Vice-President for supervising the production of bituminous coal mines, the planning and installation of new mines and the inspection of coal properties. Submit resume, stating salary desired.

Box C. A. 12
Suite 1600 Times Tower
New York 36, N. Y.

WANTED

National mining organization offers excellent opportunity for mining engineer with coal experience. Position involves writing and working with members of the mining industry.
Include information as to age, education, experience, marital status, salary requirements, and a recent photograph.

P8636 Coal Age
330 W. 42 St., New York 36, N.Y.

WANTED

Preparation Plant Engineer—Long established company in Utah has an opening for an experienced preparation plant engineer. McNally-Pittsburgh coal washing equipment is used. Salary open. Send references, photo, outline of experience and salary expected to:

P8617, Coal Age
520 N. Michigan Ave., Chicago 11, Ill.

PURCHASING AGENT

Coal mining concern requires man with technical education and practical experience in purchasing & selling coal mining equipment. Headquarters New York. Submit resume, stating salary desired.

Box C. A. 15
Suite 1600 Times Tower
New York 36, N. Y.

OUR USUAL BARGAINS

4—Late type 660-BH Goodman Loading Machines, 34" high, full hydraulic, each with one 10 HP drive and one 10 HP conveyor motor, 250 V, permissible type.
1—42" Belt Conveyor, 750' centers, Timken bearing carrying and return idlers, 7-ply Goodyear belt, 125 HP explosion-proof 440 V motor and contactor controls, speed reducer, and all necessary appurtenances.
2—JCM2E Joy Continuous Miners, 250 V, permissible type.
4—Late type Joy 11-BU Loading Machines, 250 V, permissible type.
4—5-SC Joy Shuttle Cars.
6—42E9 Joy Shuttle Cars.
5—Jeffrey 29-U Cutting Machines.

LOCOMOTIVES

4—20-ton Westinghouse Tandem Locomotives, each unit consists of two 10-ton Locomotives, Type 927-LD, 250 V motors. Hydraulic brakes, dynamic braking, sanders, contactor controls. In the 80,000 series.
4—20-ton General Electric Tandem Locomotives, each uit consist of two 10-ton Locomotives, Type GHM-848-A1, 250 V motors. Contactor controls, hydraulic brakes, dynamic braking, sanders. In the 29,000 series.

Above Tandem Locomotives were put in operation in 1950, and are completely rebuilt. Look like new shipped from the factory. Will change to any gauge.

2—20-ton Jeffrey MH-77, 250 V, complete with air brakes, sanders, and contactor controls. Practically new.
5—15-ton Jeffrey MH-77.
6—15-ton Jeffrey MH-110.
4—10-ton Jeffrey MH-143.
10—8-ton Jeffrey MH-100.
3—300 KW General Electric Rotary Converters, Type HCC-6, Form P, 1200 RPM, 250/275 V, complete with switchboards, switchgear, and I-T-E automatic reclosing circuit breakers.
1—Practically new 300 KW Westinghouse Rotary Converter, 1200 RPM, 250/275 V, complete with switchboards, switchgear and automatic reclosing circuit breaker.

Above Rotary Converters all equipped with three single phase, 60 cycle transformers, 2300/4000 V, AC.

3—200 KW General Electric Synchronous Rotary Converters, Type HCC-6, Form P, 1200 RPM, 250/275 V, complete with switchboards and all necessary switchgear including three single phase, 60 cycle transformers, 2300/4000 V.

All types Loading and Cutting Machines; Shuttle Cars; several lots of practically new Rotary Dump and Drop Bottom, all steel Mine Cars; and Single and Double Drum Slope, Shaft and Drift Hoists, complete with all necessary appurtenances.

WE SPECIALIZE IN BUYING OUTRIGHT COMPLETE MINES THAT ARE GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.

COAL MINE EQUIPMENT SALES COMPANY

Frank J. Wolfe **Phone L. D. 34** **Sheldon J. Wolfe**
Terre Haute, Indiana

ELECTRIC SHOVELS
MARION 2½ YARD CAPACITY
SHOVELS IN OPERATION AT PRESENT

IMPERATIVE TWO MACHINES BE SOLD IMMEDIATELY!
WRITE FOR LISTING OF OTHER EQUIPMENT SURPLUS TO OUR OPERATIONS

MATERIAL SERVICE CORPORATION

JOHN E. FITZGERALD — SURPLUS EQUIPMENT DEPT.
4226 S. LAWNDALE AVENUE, LYONS, ILLINOIS, PHONE LYONS 3-4969

FOR SALE
COAL AND GRAVEL CRUSHER

Bonded—Model 2824-C used, but like new with fly wheel, single roll 28" x 24". Priced right. Located in Chattanooga, Tenn. Call or write to

TESTA BROS., INC.
Richmond Road, Bedford, Ohio
Phone BE 2-5151

COAL STRIP COMPLETE

Wanted with equipment, or stripping equipment only. On tonnage basis.

N.S/Post Office
Box 6903, Pittsburgh, Pa.

WANTED

JOY 7BU LOADERS

Western mining firm interested in locating a few Joy 7BU loaders in good working order, with parts for same. Units must be powered by 440 volts, of permissible type. If you have equipment of this specification, or convertible to same write

W8559 Coal Age
68 Post St., San Francisco 4, Calif.

MODERN COAL PREPARATION PLANT

OFFERED AT A— *Sacrifice*

EXCELLENT CONDITION

A modern—5 track—400 tons per hour—coal preparation plant—located at Herrin, Illinois. This plant was built seven years ago and was designed to be dismantled economically. Roberts and Schaefer Company planned and constructed the plant with the idea that it was to be sold when the coal supply was exhausted. Now that the supply has been exhausted, Freeman Coal Mining Corporation offers this unusual opportunity to purchase the entire plant at a fraction of its original cost. The plant is in excellent condition and has been closed for only 30 days. The entire plant has been completely vacuumed and all equipment preservation measures have been taken. This is a combination wet and dry coal cleaning plant—anything under 1½" is air-cleaned—anything over 1½" is water-washed. We urge you to write or call at once for additional information.

ONCE IN A LIFETIME OFFER!

Call or Write | ANdover 3-2800

FREEMAN COAL MINING CORPORATION
300 W. WASHINGTON ST. CHICAGO 6, ILL.

MACHINERY FOR COAL MINING

Any Kind you want . . . *When* you want it . . . Always at the *right prices*

REMEMBER We have the largest stock of good mining equipment in AMERICA and at real bargain prices.

We Own What We Advertise

All types of Joy Cutters, Loaders, Shuttle Cars, Cat Trucks, Belt Conveyors, Chain Conveyors, etc. Includes

JOY EQUIPMENT, rebuilt

1—Joy 20BU, 24" high, Loader, like new.
4—Joy 14BU, low pedestal Loader, 38-) head motors.
1—Joy 14BU, 7BE Loader, 10 H. P., head motors.
2—Joy 14BU, 7CE Loaders, 10 H. P. motors.
2—Joy 12BU Loaders.
2—Joy 8BU Loaders.
6—Joy 32E9 Shuttle Cars.
2—Joy 32D Battery Cars.
2—Joy 5BC Battery Shuttle Cars.
2—Joy 5SC Shuttle Cars, 250 volt DC.
1—Joy T-1 Standard Cat Truck.
1—Joy T-2-S Cat Truck, AC.
1—Joy Ladel MTB 30", 40 H. P. tandem drive 2000' Belt Conveyor.
2—Joy PLII-14 Elevators on rubber.
1—Joy PLII-7E Elevator.
4—Joy 11B Cutting Machines, like new.
2—Joy 7BI Cutting Machines, rebuilt.
8—Goodman Machines on cats, 31" high. All hydraulic.

LOCOMOTIVES

3—Jeffrey 20 ton, type MH-110.
1—Jeffrey 13 ton, type MH-110.
3—Jeffrey 10 ton, MH-78, 42" & 44" Gauge.
8—Jeffrey 8 ton, type MH-100, 42", 44" and 48" Gauge.
12—Jeffrey 6 ton, type MH-88, 42", 44" and 48" Gauge.
7—Jeffrey 4 ton, type MH-96, 42", 44" and 48" Gauge.
1—G.E. 4 ton, type 825 Locomotives, 20" high.
10—G.E. 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Gauge.
1—G.E. 8 ton, type 822 Locomotive, 44" Gauge.
3—G.E. 10 ton, type 809 Locomotives, 42", 44" and 48" Gauge.
6—Goodman type 33, 6 ton, 44" and 48" Gauge.
2—Goodman 8 ton, type 32A, 44" and 48" Gauge.
2—Goodman 12 ton, type 29A, 44" and 48" Gauge.
1—Westinghouse type 902, 4 ton.
2—Westinghouse type 904, 6 ton.
6—Westinghouse type 907, 10 ton.
3—Gasoline and Diesel Locomotives, 4 to 10 tons.

TIPPLE EQUIPMENT

1—Jeffrey 24" x 24" Crusher.
2—Jeffrey 30" x 30" Crushers, new.
1—Jeffrey 36" x 54" Crusher.
2—Double Roll Crushers.
3—Cedar Rapids portable super Screening Plants.
1—Allis Chalmers 5' x 14' Ripple Vibrator.
1—4' x 10' Robbins Gyrex Vibrator.
Feeders, Drags, Conveyors and Loading Booms.

CUTTING MACHINES

1—Jeffrey 29C on cats.
6—Jeffrey 35L's, like new.
3—Jeffrey 35B's, and 35BB's.
2—Jeffrey 29B's on track.
1—Jeffrey 29L, track mounted.
2—Jeffrey 29C's, track mounted.
4—Baby Goodman 212's, rebuilt.
3—Goodman 312's, 18" high.
5—Goodman 412 Cutters, 18" high.
4—Goodman 512's, hydraulic, with bugdusters.
15—Goodman 12AA's and 112AA's.
10—Goodman 324 Slabbers.
2—Goodman 224 Slabbers.
2—Goodman 724 Slabbers.

LOADING MACHINES

20 Joy Loaders, all types.
1—Jeffrey 6I CLR on rubber, 28".
1—Jeffrey 43L, Shortwall Loader.
3—Jeffrey L-500 Loaders.
2—Goodman 360 Loaders.
4—Myers Whaley No. 3 Automat Loaders.
4—Clarkson Loaders.

CONVEYORS

10—Jeffrey 6I H.G. Face Conveyors.
2—Jeffrey 6I AM Room Conveyors, 300 ft.
2—6I EW Elevating conveyors.
2—6I WH 15" Room Conveyors.
3—Joy 30" Belt Conveyors, 10 to 40 H. P.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12's and G-15 Shakers.

CONVERTERS AND DIESEL PLANTS

3—100KW, G.E. TCC-6's, 250 volt Rotary Converters.
3—150KW, G.E. HCC-6's, 250 volt Rotary Converters.
1—200KW G.E. HCC-6 Rotary Converter.
1—Allis-Chalmers 200 KW Rotary Converter.
1—300KW, Westinghouse Rotary Converter.
1—400KW, G.E. Rotary Converter.
(All the above with 6900/13090 and or 2300/4000 primary transformers.)
1—200KW Portable Generator.
2—150KW MG set, G.E. and Westinghouse
1—300KW MG Set, Westinghouse.
1—200KW MG Set, Westinghouse.
1—Cummins 125KW, 250 volt DC.
1—GMC 671, 75 KVA, 220/440 volt AC.
2—Superior 190 KW, 250 volt DC.
1—Allis Chalmers, 200 KVA, AC (Natural Gas).
1—700 H.P. Shaft Heist, complete.
Complete steam plant, will sell all or any part.
Boilers, like new. 1100 H.P. 500 H. P. Transformers. Turbines, etc.

ROCK DUSTERS

1—MSA hi pressure on rubber.
1—MSA hi pressure on skids.
1—MSA low pressure Room Duster.
1—Canton Dustributor low pressure.

MISCELLANEOUS

13—Air Compressors 1 H. P. to 40 H. P.
40—Mine Pumps, all types.
Pipe, plastic, steel, transite, all sizes 1" to 8".
400 Mine Cars, Drop Bottom and End Dump, all gauges.
150 Mine Cars, 18" high, end dump, 44" gauge.
5—Brown Fayro HKL and HGD Car Spotters.
1—12 ton Differential Slate Larry.
4—Overhead Bridge Cranes.
1—Kanawha Hillside Dump.
1—16 Yd. Dragline Bucket.
5—Low vein water cars.
3—3000 Gal. Tanks, like new.
Incline Hoists, 25 to 50 H. P.
Machine Tools for mine shops.
1000 Tons Rails, all sizes.
10,000 Ft. 3 c. 5000 volt 2/0 cable.
30 tons Copper Trolley and Feeder.
6—Electric Drills, CP 572.
300 Transformers from 1 to 2000 KVA and 110 to 13000 primary volts.
400 Electric Motors, 3 to 200 H. P.
Suspension Bridge 300 ft. long for river crossings.
1—International TD-24 Angledozer.
1—International TD-18 Angledozer.
1—Caterpillar D-4 Angledozer.
1—Allis Chalmers HD-7 Angledozer.
Huge stock of Mine Supplies.

Thousands of other Items—Send us your Inquiries—It Doesn't Cost—It Pays to Buy From

Logan, W. Va. **J. T. FISH & COMPANY** Phone 2825

MANY ITEMS *SOLD!*

BUT - SOME TERRIFIC BARGAINS ARE STILL AVAILABLE

CALL OR WRITE FOR CATALOG

CHICAGO PHONE ANDOVER 3-4155

OPERATING EQUIPMENT FROM ORIENT MINE NO. 1 - BEING SOLD AT - - - SACRIFICE PRICES!

HERE ARE A FEW OF THE ITEMS

5 BU Joy Loading Machines 250 V. D.C. 42" Track Gauge.

Dooley Bros. Track Mounted drills, two drill arms mounted, on 42" Track Gauge, self-propelled truck, 260 V. D.C.

600 ALL STEEL PIT CARS
Capacity 4.4 tons, 42" track gauge, end dump.

MOTOR GENERATOR SETS
300 K. W. Westinghouse consisting of: Motor 432 H.P. Synchronous, 2200 volts; Generator 275 volts, D.C., 1090 Amps. Complete with starting equipment.

200 K.W. Westinghouse, consisting of: Motor 290 H.P., 2200 volts; Generator 275 volts, D.C., 728 Amps. Complete with starting equipment.

MINE VENTILATING FANS
Jeffrey No. 8-H-48 Aerodyne Fan with V-Belt drive and 100 H.P., 2400 volts, 1170 R.P.M. induction motor. Also connected to automatic start Waukesha gasoline engine through magnetic clutch.

Jeffrey No. 8-H-60 Aerodyne Fan with V-Belt drive and 175 H.P., 2400 / 4000 volts, 1150 R.P.M. motor and magnetic controller.

Jeffrey Air Operated Jig consisting of Standard Two-Compartment Five-Cell Baum Type Jig with 84" wide Screen Compartment to handle 500 tons per hour.

HUNDREDS OF ITEMS IN EXCELLENT CONDITION

CHICAGO WILMINGTON & FRANKLIN COAL COMPANY
300 W. WASHINGTON ST. CHICAGO 6, ILL.

LIDGERWOOD HOIST

Serial #8001. 250 H.P. 2300 volt slip ring motor drive Hoist designed for 350 f.p.m. of 1⅛" rope.
Face of drum 55 9/16", diameter to bottom of groves, 84". Electric brake connected. Split drum, all steel base, Blue prints available.
2000 KVA G.E. type H. T. Form D.H.
66,000/22000/2300/60 cycle
Serial #4540898

ELJAY INC.
L. J. Land, Pres.
401 Broadway, New York 13, N. Y.
Telephone Worth 6-0969

RELAYING RAIL
All Sizes
Track Accessories
LEFTON INDUSTRIAL CORP.
General Office: 212 Victor Street
St. Louis 4, Missouri

NEW and REBUILT STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Tons 18" to 56½" Track Gauge.
GREENSBURG MACHINE CO.
Greensburg, Pa.

IRONTON
Electric Locomotives
New and Used
The Ironton Engine Company
Farmingdale, New Jersey
(formerly IRONTON, OHIO)

An Investment!

Productive advertising is an INVESTMENT rather than an EXPENDITURE.

"Searchlight" advertisers almost invariably report prompt and satisfactory results.

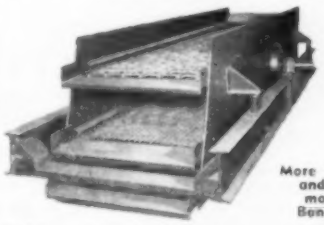
BE CONVINCED — send us your advertisement TODAY.

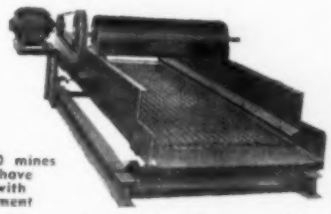
Address
Classified Advertising Division

COAL AGE
330 W. 42nd St., N. Y. 36, N. Y.

BONDED EQUIPMENT BARGAINS
IMMEDIATE SHIPMENT FROM OUR FACTORY — WRITE, WIRE OR PHONE

NEW BONDED® HEAVY DUTY VIBRATING SCREENS
"For Continuous, Economical Screening of High Tonnages"





More than 5000 mines and quarries have modernized with Bonded equipment

Model Number	No. of Decks	Screening Area	Sale Price
138BS	1	3'x8'	$1119.00
238BS	2	3'x8'	1165.00
338BS	3	3'x8'	1250.00
248BS	2	4'x8'	1695.00
348BS	3	4'x8'	1850.00
2410BS	2	4'x10'	1775.00
3410BS	3	4'x10'	2095.00
3412BS	3	4'x12'	2395.00

Model Number	No. of Decks	Screening Area	Sale Price
124AS	1	2'x4'	$355.00
224AS	2	2'x4'	375.00
126AS	1	2'x6'	375.00
226AS	2	2'x6'	395.00
136AS	1	3'x6'	495.00
236AS	2	3'x6'	585.00
336AS	3	3'x6'	815.00
138AS	1	3'x8'	575.00
238AS	2	3'x8'	695.00
338AS	3	3'x8'	845.00

For coal, mineral, chemical and other industrial products. Fast, efficient and economical for cleaning, sizing, grading, dewatering. Made in all metals including stainless steel. Enclosed models for hot materials or dust control. Bonded screens are built for any screening operation, wet or dry.
HEAVY DUTY MODELS: 4-bearing, positive throw, eccentric shaft; 3'x8' to 5'x14' 1 to 5 decks
TYPE A SCREENS: eccentric weight mechanism, spring mounted, 1 to 3 decks, 2'x4' to 3'x8'.
Heavy Duty Screens from $1119.00 General Duty Screens from $355.00

NEW BONDED® TROUGHING IDLER CONVEYOR BARGAINS
Complete Ready-Fab sections quickly and easily joined together on the job. We take our loss on our stock of short length belting. You can save as much as 70% on the **BONDED CONVEYOR SPECIALS** listed with conveyor belting in two pieces. Conveyors are equipped with 5" roll diam. idlers and return rolls, 20" diam. head pulley and 16" diam. tail pulley mounted on 2¼" or 2-7/16" diam. shaft. Belt is new 4-ply, 28-oz. duck, ⅛" top rubber cover x 1/32" bottom cover and is fresh stock made by leading manufacturers.

Remember, You Save Up To 50%

CONVEYOR PRICES INCLUDE BELTING

Belt Width	Length of Conveyor	List Price	Sale Price
18"	25'	$1327	$ 739
18"	45'	1986	1085
18"	85'	3466	1798
20"	25'	1366	770
20"	60'	2762	1426
24"	25'	1428	835
24"	45'	2227	1237
24"	100'	4425	2339
24"	130'	5624	2995
30"	50'	2669	1504
30"	70'	3576	1971

For conveyors longer or shorter than those listed above, add or deduct the following per foot prices according to belt width. Prices include belting.
For 18" belt ..... 17.20 per foot
For 20" belt ..... 18.95 per foot
For 24" belt ..... 20.66 per foot
For 30" belt ..... 23.02 per foot

BONDED CONVEYOR ACCESSORIES
All Bonded Troughing Conveyors (described above) can be equipped with Bonded Accessories or use them on your present Conveyor or Bucket Elevator.

Headpiece $90.00

Guide Idler $13.75

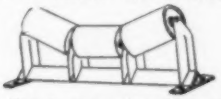
Wing Pulley $74.00

NEW CONVEYOR BELTING SAVE UP TO 25%
Heavy duty 4-ply, 28 oz. duck, ¼" top rubber cover x 1/32" bottom cover rubber belting having high tensile strength, tough cotton duck, strong carcass and proper flexibility. For heavy boxes, bags and bulk materials. Troughs easily. Famous brands at deep cut prices. Fresh stock.

Width	List Price	Sale Price
18"	$4.27 foot	$3.19 foot
20"	4.69 foot	3.69 foot
24"	5.55 foot	4.14 foot
30"	6.77 foot	5.06 foot
36"	8.01 foot	6.00 foot

Additional widths and plies available at low prices. Write for free sample.

NEW IDLERS AND RETURN ROLLS 25% BELOW LIST PRICE



3-roll, 5" diameter Troughing Idlers for

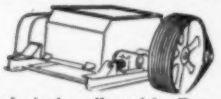
18" belt	$19.00	30" belt	$20.50
20" belt	19.25	36" belt	21.25
24" belt	19.75	48" belt	23.75

1-roll, 5" diameter Return Idlers for

18" belt	$7.50	30" belt	$ 8.75
20" belt	7.75	36" belt	9.25
24" belt	8.00	48" belt	10.75

All steel. Interchangeable with other well-known makes. Replaceable ball bearings. Either sealed type (pre-lubricated) or with alemite fittings. Maintenance is negligible.

NEW BONDED® COAL CRUSHERS



Double and single roll models. Types to produce ¾" stoker and others to crush up to 8" resultant. Capacities from 15 to 500 tons per hour. Steel hoppers included. Write for new 8-Page Bulletin 1119.
Priced from $479.00

VISIT THE BONDED FACTORY ANY TIME — WRITE FOR FREE CATALOG AND PRICES

BONDED SCALE & MACHINE CO.
2190 S. THIRD, COLUMBUS 7, OHIO—PHONES: Hickory 4-2186; FRanklin 6-8898, Evenings
Mfgrs. of Scales, Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers and Feeders

CAT TRUCKS

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3—6 BU Joy Loaders, 220 volts, DC.
1—14 BU, 250 volts, DC., Joy Loader.

LOCOMOTIVES

10—15 ton MH77 Jeffrey ball bearing armature locomotives, complete with hydraulic brakes. New in 1947, used 3 years, as good as new. Complete specifications as follows:
42" gauge, overall dimensions, length 16', 8" width 5' 4½", wheelbase 6' 4", height 42". Heavy duty equipment making locomotive weigh approx. 17 tons.

3—15 ton MH77 Jeffrey ball bearing armature locomotives, 42" gauge, not with hydraulic brakes, late type, as good as new. Dimensions: length 16' 8", width 5' 4½", wheelbase 6' 4", height 42". Heavy duty equipment making locomotive weigh approx. 17 tons.

1—10 ton MH143 Jeffrey locomotive, complete with ball bearing journals and armatures, #7575, 42" gauge. Overall height 34", length 14' 2", with 61". This locomotive was used very little. Just like new, and we have an extra set of new armature field coils and new parts worth several hundred dollars.

2—10 ton General Electric, ball bearing, 48" gauge.
2—8 ton Jeffrey ball bearing journals, and motors, 60" gauge, type MH 78.
25—6 ton MH 88 Jeffrey, ball bearing, 42" gauge.
1—8 ton Goodman, type 91K42-54T, 42" gauge, 27" high, new in 1950, used only 6 months.
12—6 ton Mancha Battery Locomotives, 42" gauge, 42" high overall. Sold with or without batteries. All Electric locomotives 250 volts DC.

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1—Stearns 36" magnetic pulley.

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20—512 BUH Goodman, 250 volts, DC, permissible, 8½' cutter bars with hydraulic jacks and bug dusters, complete with Joy T1 cat trucks.
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2—200 KW General Electric motor generator set, 1200 RPM, 2300 volts AC end, 250/275 volts DC end, complete with automatic circuit breaker, late type.
1—200 KW Westinghouse motor generator set, 900 RPM, 2300 volts AC end, and 250 volts DC end.
2—150 KW General Electric motor generator sets, 2300 volts AC end, 250/275 volts DC end.
5—150 KW Westinghouse motor generator sets, 1200 RPM, 2300 volts AC end, 250 275 volts DC end. Above sets all complete with either fully automatic switchboards or manual starters and automatic circuit breakers.

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(W) 1—30 x 30 American Pulverizer

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(W) 3—6' Jeffrey Aerodyne Fans
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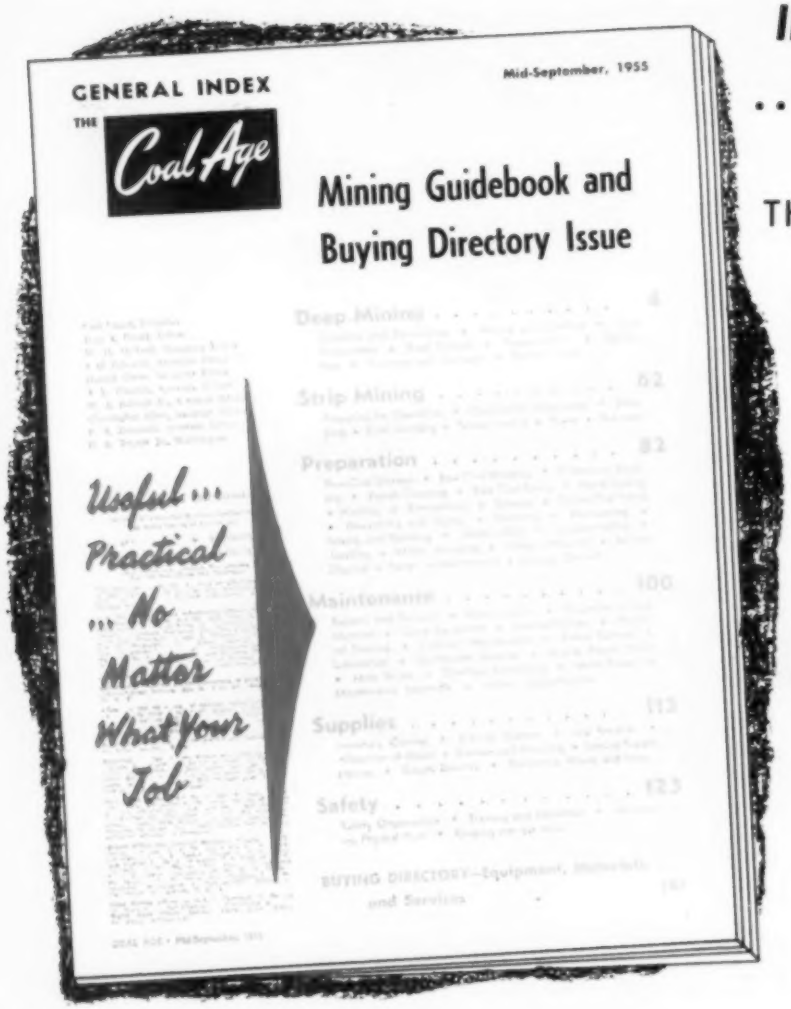

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You Widen Your Job Outlook

The first issue of a new annual service for all subscribers, the Mid-September 1955 COAL AGE "GUIDEBOOK" is the largest, most complete *single* source of information on current mining practice available anywhere.

The new COAL AGE Mining Guidebook and Buying Directory Issue was inaugurated to serve you as a practical on-the-job reference manual on all phases of modern mine operation. You'll find it a helpful timesaver, whether you have a definite problem, are seeking to improve your methods or are planning a new installation.

Ideas are the backbone of mining progress. New techniques, changes in methods, improved equipment are important. Used consistently, the COAL AGE Guidebook can help you keep up on what's going on. It's a good starting point for developing new ideas . . . a sure way to broaden your personal horizon.

The 1955 Guidebook – complete in one volume – outlines the basic mining principles you have to deal with . . . summarizes current operating practice and results at hundreds of efficient, low-cost mining properties. The 42-page Buying Directory, together with manufacturers' advertising, will help you locate equipment, materials and services geared to your particular needs.

The 172-page Guidebook section – about 2½ times the size of the usual COAL AGE issue—is the largest single editorial section ever published in any coal mining publication. It's the only up-to-date, complete guide to mine operation published today. In fact, COAL AGE Editors developed the idea for this additional issue just because hundreds of mine officials told us they needed and wanted such a practical reference manual. Its potential usefulness to you is indicated by subscribers' typical comments quoted here.

COAL AGE's Mining Guidebook and Buying Directory Issue is an established annual service provided subscribers at no additional cost. The 1956 edition, completely revised and up-dated, will be published in Mid-July, 1956.

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COAL AGE ADVERTISERS IN THIS ISSUE

Allegheny-Ludlum Steel Corp. ... 125
Allis-Chalmers Tractor Div. ... 37
American Cable Div.
American Chain & Cable Co. ... 25
American Cyanamid Co., Explosives Dept. ... 107
American Oil Co. ... 34
American Pulverizer Co. ... 145
American Steel & Wire Div. ... 44-45
Ancaonda Wire & Cable Co. ... 137
Armstrong-Bray & Co. ... 128
Ashland Oil & Refining Co. ... 103
Athey Products Corp. ... 99

Baldwin-Lima-Hamilton Corp.,
Construction Equipment Div. ... 133
Bearings, Inc. ... 159
Bethlehem Steel Co. ... 10, 42, 105
Bird Machine Co. ... 4
Bixby-Zimmer Engineering Co. ... 100
Bowdil Co. ... 13
Bucyrus-Erie Co. ... 12, 127
Builders-Providence Div. of
B-I-F Industries, Inc. ... 97

Cardox Corp. ... 8-9
Caterpillar Tractor Co. ... 85, 115, 160
Chicago Pneumatic Tool Co. ... 91
Cities Service Oil Co. ... 101
Coal Age Guidebook ... 156-157
Columbia-Geneva Steel Div. ... 44-45
Connellsville Manufacturing &
Mine Supply Co. ... 124

Differential Steel Car Co. ... 122
Dodge Div., Chrysler Corp. ... 129
Dodge Manufacturing Corp. ... 140
Dorr-Oliver, Inc. ... 102
Drott Manufacturing Co. ... 89
Durakool, Inc. ... 130
duPont de Nemours & Co., E. I.,
Explosives Dept. ... 24
duPont de Nemours & Co., E. I.,
Rubber Chemicals Div. ... 36

Ensign-Bickford Co. ... 52

Fairmont Machinery Co. ... 95
Firth Sterling, Inc. ... 43
Flood City Brass & Electric Co. ... 138

Gates Rubber Co. ... 142
General Electric Co., Direct Current
Motor & Generator Dept. ... 14-15
Goodman Manufacturing Co. ... 19
Goodrich Co., B. F. ... 1, 93
Gould-National Batteries, Inc. ... 87
Guyan Machinery Co. ... 128

Hamilton Rubber Manufacturing Corp. ... 147
Hazard Insulated Wire Works Div.
of The Okonite Co. ... 131
Hendrick Manufacturing Co. ... 138
Hercules Powder Co. ... 141
Hulburt Oil & Grease Co. ... 2-3

International Harvester Co., Truck Div. ... 40
International Harvester Co., Drott Mfg. ... 89
International Harvester Co., Power ... 26-27

Jeffrey Manufacturing Co. ... 22-23
Jones & Laughlin Steel Corp. ... 51
Joy Manufacturing Co. ... 28-29, 120, 136, 144

Kennametal, Inc. ... 81
Koehring Co. ... 20-21

LeRoi Div. of Westinghouse
Air Brake Co. ... 18
LeTourneau-Westinghouse Co. ... 33, 35
Lee-Norse Co. ... 98
Link-Belt Co. ... Fourth Cover
Lubriplate Div., Fiske Bros.
Refining Co. ... 132
Ludlow-Saylor Wire Cloth Co. ... 106

Manhattan Rubber Div. ... 50
McNally-Pittsburg Mfg. Corp.
Insert between pp. 36-37, 96
Metal Carbides Corp. ... 144
Mine Safety Appliances Co. ... Second Cover
Morton Salt Co. ... 143

National Malleable & Steel Castings Co. ... 46-47
Newcomer Products, Inc. ... 132

Ohio Brass Co. ... 123

Page Engineering Co. ... 146
Paris Manufacturing Co. ... 147
Pennsylvania Drilling Co. ... 144
Post-Glover Electric Co. ... 134

Quaker Rubber Div.,
H. K. Porter Co. ... 111

Raybestos-Manhattan, Inc. ... 50
Roebling's Sons Corp., John A. ... 109
Rome Cable Corp. ... 48-49

Sanford-Day Iron Works ... 16-17
Schroeder Bros. ... 130
Searchlight Section ... 148-154
Simplex Wire & Cable Co. ... Third Cover
Socony-Mobil Oil Co. ... 41
Stamler Co., W. R. ... 126
Standard Oil Co. (Indiana) ... 30-31
Stearns Magnetic, Inc. ... 135

Tennessee Coal & Iron Div. ... 44-45
Texas Co. ... 6-7
Timken Roller Bearing Co. ... 32
Trabon Engineering Co. ... 11

Union Wire Rope Corp. ... 38-39
United States Rubber Co.,
Mechanical Goods Div. ... 83
United States Steel Corp. ... 44-45
United States Steel Export Co. ... 44-45

Victaulic Co. of America ... 104

Western Machinery Co. ... 139
Wilmot Engineering Co. ... 113

PROFESSIONAL SERVICES ... 154

CLASSIFIED ADVERTISING
F. J. Eberle, Ass't. Mgr.

EMPLOYMENT OPPORTUNITIES ... 148

EQUIPMENT
(Used or Surplus New)
For Sale ... 148-153

WANTED ... 148

ADVERTISERS INDEX

Bonded Scale & Machine Co. ... 151
Chicago, Wilmington & Franklin Coal Co. ... 150
Coal Mine Equipment Sales Co. ... 148
Electric Machine & Supply Co. ... 153
Electric Service Co., Inc. ... 152
Eljay, Inc. ... 151, 153
Fish & Co., J. T. ... 150
Fitzgerald, John E. ... 149
Freeman Coal Mining Corp. ... 149
Gavenda Brothers, Inc. ... 152
Greensburg Machine Co. ... 151
Harris-Walsh, Inc. ... 152
Ironton Engine Co. ... 151
Lefton Industrial Co. ... 151
Material Service Corp. ... 148
Morse Bros. Machinery Co. ... 153
Shasta Coal Corp. ... 153
Simpson, T. L. ... 152
Testa Brothers, Inc. ... 148, 153

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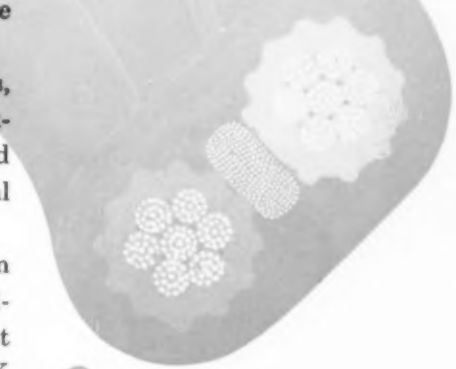

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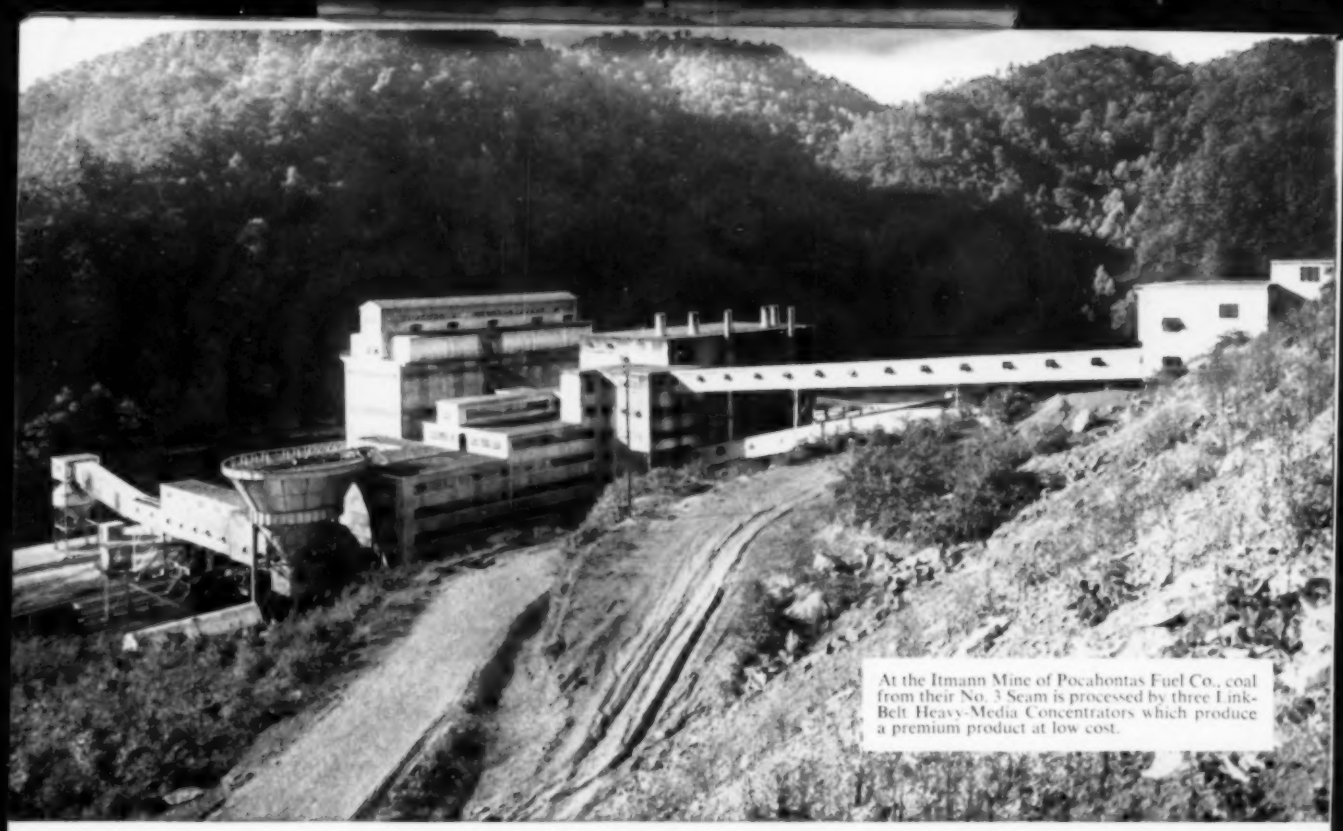

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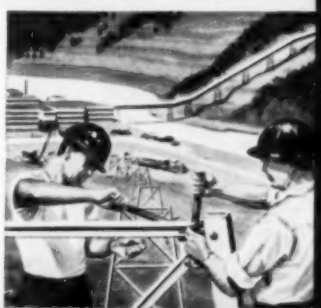
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